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LARNACA DISTRICT DEVELOPMENT AGENCY

«REGIONAL COOPERATION TOWARDS ADAPTATION TO CLIMATE CHANGE»

Climate Change Adaptation Strategies for LRAs
(Consolidated Report: North/ Central / South Europe)

Component 4: Policy formulation

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Annex I: Regional Climate Change Adaptation Priorities in selected EU MS

Executive summary

Mitigate we might, adapt we must.

W. D. Nordhaus

Climate change has risen to be one of the most complicated challenges that modern political agendas have to face, with impacts transcending administrative boundaries and demanding multi-level international cooperation towards making best use of the technology, experience and means available. In this context, the purpose of this report is to provide EU LRAs with a concise document describing CCA strategic approaches and interventions best suited to the local (regional) perspective. The report consolidates the findings of the project partners' joint work together with external experts, presented through the three (3) Climate Changer Adaptation Strategy Reports (North, Central & South Europe). Specifically it aims to (i) emphasize the need to adopt CCA strategies, (ii) underline the importance of coordination of CCA strategies of EU LRAs, (iii) assist LRAs in their tasks towards minimizing the risk and level of impacts of CC across EU cities and regions and (iv) explore the potential of and project opportunities of strategic synergies between EU LRAs to adapt to CC (e.g. common opportunities for business development in specific sectors such as tourism, transport, other infrastructure, etc.), (v) identify possible conflicts among the proposed strategies (e.g. interventions in the agricultural sector of the North European region affecting the competitiveness of the same sector in Southern Europe, etc).In brief, this consolidated report promotes multi-level coordination of the response to the phenomenon of CC, by serving as a reference tool in the development and implementation of CCA strategies for European LRAs.

Climate Change Adaptation Policy

A wealth of CC related documents and international agreements have been promoted during the last couple decades, including the United Nation's Framework Convention on Climate Change (UNFCCC), the IPCC report (2007), the Bali Conferences (2007), the Copenhagen (2009) and the Rights of Mother Earth at the Cochabamba Summit (2010). The UNFCCC operates through specific processes, which are clearly outlined to function as a framework for intergovernmental joint action. LRAs play a major role in helping their national governments to meet their GHG emission reduction targets and to achieve mitigation of the anthropogenic causes of CC. Similarly, in terms of adaptation, local authorities are instructed, or often compelled, to prepare for CC impacts and make best use

of the tools, incentives and guidance that are provided by national strategies. On an international level, these government organisations, act as representatives of local governments in designing and implementing national development plans and adaptation strategies related to CC. The drawing of climate resilient and environment friendly growth on a regional level falls very much in the hands of local authorities who are called to not only provide accurate relevant information and set priorities, but also implement innovative actions. It is clear that well-managed urban areas, in addition to serving as the means in the achievement of national targets, are in a position to adapt faster to shifting circumstances.

European Union Policy

The EC White Paper 'Adapting to climate change: Towards a European framework for Action' sets the framework for reducing the EU's vulnerability to the impacts of CC. This document serves as the response to the need for development of a coordinated strategic approach to this phenomenon. The variation in CC effects and their magnitude from one region to another means that most adaptation measures will have to be adopted on a national, regional or local level. However, these should be supported by a general framework of integrated and coordinated action at an international level. The strategy that is promoted by the EC White Paper is based on the coordination of the regional CCA measures that are adopted in the various sectors of society and between Member States. The objective of the EU's adaptation framework strategy is to maximize the Union's resilience to the impacts of climate change. The EC White Paper 'Adapting to climate change: Towards a European framework for action' is based on a five-axis framework: Health and social policies, Agriculture and forests, Biodiversity, ecosystems and water, Coastal and maritime areas, Production systems as well as physical infrastructure. Although these five sectors have been independently analysed, it is apparent that there are significant overlaps between them, with activities in one thematic area often having effects on another.

Regional Climate Change Adaptation Priorities

Following international guidelines and national requirements, several regional authorities across the EU have taken initiative action, so as to address the problem of adapting to a changing climate. Innovative action by LRAs however, extends to more than coordinating projects, disseminating results and forming alliances. It is through cities and local authorities that MS can reach their national adaptation and mitigation targets, as they are identified by each NAS. For this reason, LRAs need to realize their full potential in adapting to altering climatic conditions and adopt innovative techniques that are developed through concise research on the impacts of CC and their own adaptive capacity.

Climate Change Adaptation Strategies

The EU and its MS have undertaken proactive adaptation actions by developing strategies based on future climate change projections. A number of EU MS have adopted national

adaptation strategies or are in the process of doing so, including Denmark (2008), Finland (2005), France (2007), Germany (2008), Hungary (2008), The Netherlands (2008), Norway (2008), Portugal (2010), Sweden (2009), Spain (2006) as well as the United Kingdom (2008). CC Adaptation can be geared either to reduce the potential impacts of effects of climate change on natural and human systems and our general vulnerability to climate change or to increase adaptive capacity. As regards policies related to climate change, various types of adaptation are distinguished: The anticipatory adaptation, the autonomous adaptation as well as the planned adaptation. The anticipatory adaptation takes place before impacts of climate change are observed, whereas autonomous adaptation does not constitute a conscious response to climatic stimuli, but is triggered by ecological changes in natural systems and by market or welfare changes in human systems. Contrary to these two approaches, planned adaptation is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.

The analysis of climate change adaptation factors and measures, indicated the following factors as key for adaptive capacity support: economic resources, technology, information/awareness, skills/human resources, natural resources, infrastructure as well as institutional support/governance.

Measures and actions

The following types of measures and actions are distinguished: Anticipatory (proactive) adaptation, which takes place before impacts of climate change are observed, in contradiction to reactionary adaptation, which is restricted to taking actions to alleviate impacts after they occur. Another type would be the so-called defensive/mitigative measures that seek to lessen or negate negative impacts against opportunistic measures, which aim on strengthening or exploiting advantageous impacts. Most strategies currently anticipate climate change adaptation measures taking place incrementally, as a slow and low cost change building on the existing infrastructure. A significant change would also require a transformational, cultural shift within the existing organisations. Measures which seek to lessen or negate negative impacts depend on the rate of change of these features. In order to ensure broad adaptation to climate change further than the capacity which regional authorities show, it is obligatory to highlight the increased adaptive potential of other key actors as well. This includes central government, local administration, non-state organisations such as private business and NGOs as well as the general public. Adaptation services are emerging at the same time that governments, businesses and communities worldwide are recognizing the need to address current and potential climate change impacts. Such elements regard both the local perspective on adaptation processes as well as the involvement of key stakeholders.

However, there are a number of key vulnerabilities that have to be comprehended in order to identify areas most at risk. They can be described in terms of exposure, sensitivity and adaptive capacity. Priorities must be made for vulnerable systems that will reflect the nature of current and potential impacts of climate change. The criteria published by the Intergovernmental Panel on Climate Change help identify key vulnerabilities that should be considered. There are varying degrees of certainty and vulnerability involved for each adaptation option. In order to choose an appropriate option, the following criteria should be considered: No–regret, profit/opportunity, win–win, low–regret, avoiding unsustainable investments and averting catastrophic risk.

Strategic Environmental Assessments

Strategic Environmental Assessments (SEA) can be carried out "ex-ante", during the implementation of a specific program (intermediary assessment) or "ex-post". An "ex-ante" assessment is performed during the preparation of the action plans and before their adoption. According to the SEA Directive, this includes a) the drawing up of an environmental report in which the likely significant effects on the environment and the reasonable alternatives are identified and b) the carrying out of consultations (with the public, the environmental authorities, other stakeholders and with other countries in the case of trans-boundary impacts). The specific principles which are required in order to ensure a viable and reliable SEA are a strong will of the decision-makers, a sound and reliable development framework, a specific methodology and flexible tools, strict implementation and follow-up, the participation of stakeholders and the wider public as well as the horizontal integration of environmental concerns in socioeconomic policies. As a general rule, the process of conducting a Strategic Environmental Assessment (SEA) takes in the following stages: Screening, scoping, assessment, review, decision making, environmental report, implementation and monitoring the physical changes within the respective sectors as well as the administrative processes involved in adapting to climate change.

How LRAs can adapt to Climate Change

In order to adapt to Climate Change, LRAs should consider a wide variety of recommendations, focusing on activity timeframes, synergies, monitoring systems, guiding principles, as well as examples for priority adaptation actions. These recommendations mainly dwell on continuous availability of resources, reserve capacity to support operations in emergency situations, potentials for increased adaptive capacity of other key actors as well, mobilization of other actors and energy security at the level of CC adaptation.

North Europe

The main strategic objective in North Europe is to address and mitigate the dominating CC impacts in North Europe, where possible in a cost effective and timely manner. The impacts

of climate change are anticipated to take place gradually over a relatively long time period but the lifecycle of many planning measures, particularly those that involve infrastructure planning, is also counted in decades. As such, the impacts of climate change should be integrated into decision making processes in these sectors even from now on. However, integrating the impacts of climate change into decision making requires a solid and reliable information base. While national monitoring and research programmes usually provide solid overarching information about physical climate change, monitoring at a local level will facilitate more nuanced decisions based on specific local conditions. It is therefore important that local monitoring is in place to provide such information. The North Europe report has found a significant information imbalance between the three Scandinavian countries and the three Baltic countries. Much of the lack of concern for the impacts of climate change in the Baltic States could stem from a lack of knowledge of those impacts particularly at the administrative level (notwithstanding the absence of administrative capacity and financial capital to invest in adaptation processes).

Synergies are manifold between the northern countries. Regular knowledge exchange would benefit all countries in the region, and allow the Baltic States – which are to date lacking behind the three Scandinavian countries in respect to climate adaptation – to quickly catch up. Increased information and knowledge would allow for better risk assessment in the Baltic States and sharpen the awareness for the necessity to adapt to climate change in Estonia, Latvia and Lithuania. So far – even though impacts of climate change seem to be similar in all of the countries – the three Baltic States do not seem to realize the same necessity to adapt to these risks as the three Scandinavian countries do. On the other hand, the priorities for climate adaptation across Denmark, Estonia, Finland, Latvia, Lithuania and Sweden are similar. Greatest consistence seems to exist on issues regarding the Baltic Sea. This is both logic and very valuable, as it will increase the likelihood of coordinated action. So far, despite the recognized great necessity to act, climate adaptation measures in respect to the Baltic Sea seem to be lagging behind. At the same time cooperation on other issues regarding the Baltic Sea have been manifold (e.g. the Helsinki Commission), thus the institutional framework for quick action is given.

Least action seems to be necessary in agriculture and forestry. In respect to biodiversity and the Baltic Sea on the other hand rapid and determined action will decide upon success or failure. Finally, more work appears to be necessary in terms of societal awareness building and to reach a political consensus. It has to be stated that none of the examined countries seems to have reached a point where all stakeholder groups work together to adequately and timely adapt to climate change. For instance, the capacity of health care systems has to be adjusted, simultaneously focusing on disadvantaged groups. In forest management, the roles of forestry authorities as well as private land owners have to be redefined. Cables for telecommunication and electricity have to be moved to the underground, pressure on endangered ecosystems has to be reduced. Control of invasive species should also be

achieved, whereas the emigration of native species could be facilitated. In the sector of agriculture and fishery soil eutrophication and acidification as well as overfishing should be prevented, habitats restored and preventive constructions implemented. The capacity of the waste water system, the natural drainage as well as the total area of permeable ground has to be increased, whereas upstream defences should be strengthened. Also an information, warning and monitoring system has to be established. Drinking water must be protected. In the field of damage prevention and repair the relocation possibilities of populations and industry complexes has to be examined. Furthermore, the maintenance both of transport infrastructures and the insurance systems has to be scheduled. For all these proposed actions the involvement of the related stakeholder groups is included into the report.

Central Europe

In Central Europe the priorities that should receive the highest level of attention can significantly vary from country to country. For instance, in Austria priority is given by the project team purely to flooding abatement and winter tourism, whereas in Bulgaria the focus is on drought, coastal erosion, flooding and damages, insufficient transport infrastructure, increased energy demand as well as increasing expenses for social policies. In the Czech Republic, flooding and water management, increased energy demand, an increase of climate related diseases are identified, in France accordingly urban heat islands, sea level rise, an increase of climate related diseases, increased energy consumption for air conditioning, loss of species, summer tourism as well as deforestation. The priorities identified for Hungary are flooding and water management, deterioration of ground water reserves as well as summer tourism; for Italy extreme change in storm frequency and strength, increased energy demand, intensive land use and flooding. In Romania, drought, water scarcity, coastal erosion, flooding and damages, insufficient transport infrastructure as well as tourism are priority fields of impacts. Finally, for Slovakia flooding as well as the need for supplementary energy import are estimated as priorities.

The related assessment allows the combination of the two criteria (a.) the possibility of the impact and (b.) the level of an impact to the environment and to the current social and economic situation of each region participating at the project. These possibilities have been firstly assessed by the partners, who responded to specific project questionnaires. Subsequently, the project consortium concluded to a series of adaptation measures for Central Europe. In the priority area of flooding better flood risk vulnerability mapping and regulation of vulnerable land is envisaged. Investments in improved weather forecast, better warning systems and more efficient evacuations, better information of people about the flood risks and better enforcement of existing building codes as well as improvement of them is foreseen so that the new structures are better able to withstand extreme weather events. Moreover, the usage of floodplains instead of levees is proposed since those would act as buffers for remaining areas. County-scale coastal erosion and coastal damage maps

should be developed and investments in improved sea weather forecast, early warning systems and flood hazard mapping for storms accelerated. Environmental degradation has to be reduced where the loss of vegetation destabilizes shore, leading to dangerous landslides. Accordingly, the wetlands and beaches that act as natural seawalls against extreme weather events have to be protected. Also water supplies from contamination by saltwater must be protected.

Enhanced design, siting standards and planning guidelines are required for coastal tourism establishments as well as improved education and awareness raising among tourism businesses, their staff and tourists. Technical measures are foreseen in the winter tourism resorts. Moreover, the project team proposes measures which can change the behaviour in the winter tourism resorts such as transition towards non-snow dependent activities. As regards the priority area of human health, a reduction of urban heat islands by planting trees and providing vegetation and water in urban environment is obligatory, whereas investments in improved surveillance and warning systems for heat stress, aeroallergens and for the prevalence of allergic diseases, particularly asthma, as well as in improved public health controlling systems are envisaged. Additionally, improved education and awareness rising among the population is proposed. Increasing energy efficiency is required in order to offset increases in energy consumption due to warming whereas protecting facilities against extreme weather events and/or relocation of the infrastructure to more secure locations is indicated. The project consortium also proposes the development of strategies to address changing demand patterns and elaborated on the understanding of infrastructure vulnerability in order to implement appropriate reinforcement measures. Finally, diversifying power supply in the event of power plant failures due to excess demand created by extreme heat, or by extreme weather events is proposed as a further mitigation measure.

South Europe

Water scarcity and management of water resources is a primary concern for all South Europe partners, with issues of energy production and energy infrastructure coming second but at more or less the same level of importance. This applies to agriculture as well, as all regions-partners face the deterioration of cultivable land and the loss of competitiveness for their products in the European and international market. Forest fires of course are a common concern for all South Europe partners and this, for instance, could be another opportunity for cooperation and knowledge exchange on how to adapt to changes in climate so as to prevent them from causing fires. Pollution is another representative example of the situation: Greece rates air, soil and maritime pollution as important with medium possibility to occur, whereas for Cyprus air pollution is a low level impact without much possibility to occur; for Spain, soil pollution is far more probable to occur than air pollution, whereas for France the opposite is stated.

These structural overviews lead to the conclusion that the seven discussed regions: Greece, Cyprus, Italy, Spain, France, Portugal, Malta can be categorized in three groups, which may not be completely distinct, they are however useful as a means of analysis of the present situation and as a tool for the proposition of new adaptation strategies and policies: a) Cyprus – Greece – Malta, b) Spain – Italy and c) France – Portugal. The regions of each group have similar geographical and economical characteristics and they also share common problems and priorities in terms of climate change impact.

For example, the regions from Cyprus, Greece and Malta need to tackle more the impacts of the policies on water resources, tourism and infrastructure, whereas the regions from Spain and Italy are called to give priority to coastal impacts and France-Portugal to forests, biodiversity and health impacts. More particularly, the members of the first group share important concerns and high priorities in sectors such as water management and drought, energy production shortage and infrastructure failure and significant tourism impacts. The second group of regions is mostly occupied with issues such as agricultural production and competitiveness, coastal impacts, water shortage and floods. The third group has prioritized the impacts in the sectors of forests, tourism, health impacts, forests/biodiversity and agriculture.

Regardless of the above categorization though, most of these south European regions have identified certain aspects and specific impacts as more or less important and in need of attention. These include agriculture, water management, health impacts, coasts and energy sufficiency. In terms of capacity to adapt to climate change, almost all partners of South Europe attribute great importance to factors such as the ability to process information and the willingness of all stakeholders to cooperate and find common grounds. Building the adaptive capacity of each region is crucial for the development and successful implementation of adaptation measures.

In times of economic and financial instability, like today, the implementation of adaptation measures may appear strange or even very difficult. Implications could arise from many sources, such as the lack of flexibility of public administrations, the lack of willingness for public and private sector to cooperate and build consortia, the inefficiency of awareness-raising campaigns or even the very impacts of climate change getting worse and worse. As tourism, agriculture, human health and everyday life are intensely and constantly affected by the impacts of climate change, the regions of South Europe need to recognise that overcoming any implications and adapting to this change is certainly for their medium- and long-term benefit. After all, already most of the existing regional or national adaptation strategies or plans not only mention but take for granted the fact that if countries do not act immediately and pay the cost now, the price that will be paid later will be significantly higher.

Strategic alliances, synergies and threats

Climate change will have major implications for the EU's regional and cohesion policy and should be dealt with as a broader EU consideration, when deciding on the provision of technical and financial assistance to the most affected areas. Adaptation strategies should be cross-sectoral and developed within regional strategic alliances and cooperation policies; elements of such an approach including Climate Change related synergies and threats, as well as key recommendations for LRAs, are summarised below:

1. In the agriculture and forestry sectors, it is to the interest of LRAs to promote interregional cooperation in the marketing of agricultural/forestry/fisheries products, as well as EU level action towards the support of agricultural areas which are expected to face sustainability problems due to climate change. LRAs could advocate for EC support to address a potential gradual reallocation of rural manpower, equipment, know-how and capital resources from areas where agricultural activities decline, towards existing or new areas and sectors of rural interest.
2. In line with EU agricultural product quality policy, LRAs should establish mechanisms promoting exchange of experiences in specific agricultural sectors of interest, as well as seek funding for the establishment of more sustainable land use practices.
3. Climate change, with a little help from technology advancements, has opened up completely new possibilities in plant culturing; LRAs should opt to make best use of available EU funding, awareness-raising and exchange of experiences tools in order to boost these new agricultural opportunities. Moreover, interregional cooperation should be encouraged towards exploring new geographical areas and fields of application for technical and agricultural know-how developed in Southern Europe.
4. Climate Change is a serious challenge for the tourism industry. On the one hand, in Southern Europe it mainly stands as a risk; protection of the tourism economy from climate change requires large scale land-use planning considerations, as well as the wide implementation of environmental projects in priority areas. LRAs should therefore advocate stronger involvement in planning processes at EU level, and make best use of available EC support (in terms of access to funding, knowledge and experience transfer tools, capacity building as regards organisational skills) towards the joint design and implementation of large scale environmental projects, often involving interregional cooperation.
5. On the other hand, in several EU areas, such as the Western and Central parts of Europe, climate change provides an opportunity for the tourism business to grow significantly, along with the expected prolongation of the tourism season. LRAs should therefore advocate national and EU level action facilitating a more balanced tourism flow, with an increase in the number of tourists travelling to destinations outside the high season. In practical terms this could mean for instance rescheduling of schools' holidays (coupled with an awareness-raising campaign on new trends in holiday

planning) in order to allow families to organize regular holidays also in spring and autumn.

6. Extreme climate conditions such as high temperature and water scarcity, demand solutions for the improvement of living conditions, such as more efficient air conditioning in buildings or adequate water supply. As indicated in the work of REGIOCLIMA partners, a large number of relevant good practices have already been implemented by EU LRAs; therefore enhancement of collaboration among LRAs is considered essential towards the transfer of good practices in Climate Change Adaptation.
7. Depletion, extinction or loss of habitats and changes in species distribution is likely to occur in areas within all EU MS. To address this issue, cross-border flora and fauna management is required among other issues. In this respect, joint ecosystems management approaches should be developed by neighbouring regions, giving particular attention to land-use planning considerations.
8. As regards the modifications required in national risk management due to climate change, synergies between the geographical areas in Europe can be established at national authority level and in the field of civil protection. LRAs who are most affected by forest fire incidents could advocate the development of a joint protection fleet, covering the operational needs of forest fire fighting at pan-European scale, as well as the provision of EC funds for the exchange of experiences among EU MS and the development of relevant capacities in the field of forest fire fighting.
9. Climate change impacts on urban green spaces are gradually becoming visible; when these are combined with urban heat phenomena, they put in danger the microclimate of green spaces. LRAs would save significant resources by employing experts specialising in the design of green spaces, and by applying this expertise in the selection of new plant species and the implementation of landscaping works. Moreover, LRAs can make best use of Structural funds to re-design open spaces, in order to make them appropriate for use during extreme (for the region and the season) climatic conditions.
10. The EU White Paper on adaptation to climate change, stresses that, MS should integrate adaptation activities when preparing their programmes for Community support, an issue particularly relevant for infrastructure projects. LRAs should advocate the provision of relevant technical expertise and financial resources within the context of the Structural funds, in order to ensure that medium and long-term investments are “climate proof”.
11. Population exposure to increasing incidents of air pollution and high temperatures phenomena in several urban centres in south Europe, puts pressure on the (in several cases regional) health systems of the countries involved. Given that extreme temperatures usually coincide with the high season in tourism destinations, and in view of the implications of the new Directive on patients’ rights in cross-border

healthcare, it is strongly recommended that awareness and information campaigns about potential health risks due to extreme heat, targeting the local population, be implemented not only in South Europe, but also in northern and central Europe. LRAs can assist in that respect, by mobilising their networks to promote relevant initiatives.

1. Introduction

Changes in climate have risen to be one of the most complicated challenges that modern political agendas have to face. Around the world, the rates of change in climatic characteristics often dictate changes in social conditions, as well as the ability of communities to generate profit, making it essential for countries to implement the appropriate policies that will help them adapt to new circumstances. However, on a global level, these changes are not equally distributed, as not only do land masses warm up faster than the oceans, but also temperature increases are greater at higher northern latitudes (IPCC, 2007). Therefore, different regions will experience the consequences of CC in different ways and need to develop strategies accordingly.

The possibility and level of impact of the effects of CC depend greatly on the geographical conditions of each area, meaning that there is no a priori relationship between the environmental harm caused by a region and the consequences it experiences in terms of climate change. It is not rare to see the environmental consequences of heavy industrialization of one region migrate to other regions, which often lack the capacity to absorb these upshots. As a result, new causes of economic imbalances between regions emerge, like the already apparent unequal distribution of marginal cost of mitigation techniques and of funds to develop and implement adaptation strategies, relying on the overall effects that CC has on any specific area and on the ability of that area to effectively adapt to shifting environmental conditions.

To address this differentiating factor effectively, taking into account that climatic changes transcend administrative boundaries, not only national level but also regional and local governments, will have to make best use of the technology, experience and means available; to this end, multi-level international cooperation is considered essential.

Cooperation between MS on the issue of CC depends on multiple scales of governance, as adaptation measures can be adopted from an individual to an international scale. Of course, Local and Regional Authorities (LRAs) play their own role in these processes, as it becomes apparent in chapter 2.4. Indeed, in many cases across the EU continent, the development of National Adaptation Strategies (NAS) relied mainly on input by LRAs (e.g. Germany, France, UK) (PEER Report, 2009). Moreover , the importance of local specificities in the distribution of CC impacts often implies that development and implementation of CC adaptation strategies should preferably be included in the jurisdiction of LRAs, especially when it comes to emergency response and risk management (e.g. flood risk management), or to spatial planning.

The impacts of CC that have taken place during the last decades are significant, but often not easily recognized or quantified. On the one hand, scientists successfully measure

temperature fluctuations, the amount of ice melting, sea level rising and incidences of flooding, droughts, cyclones and wildfires. In fact, the accumulation of such data has helped scientists create climatic models on which most of modern meteorological assumptions are based. On the other hand, social and economic consequences, such as environmental migration, food shortage and rapid disease spreading and water scarcity are harder to quantify.

In either case, as the effects of CC became largely apparent during the 20th century, adjusting to the new circumstances became a focal point of interest in international politics. The debate over the reactions to CC has so far revolved around the concepts of 'climate mitigation' and 'climate adaptation'. Climate mitigation strategies refer to the causes of CC by attempting to alleviate the anthropogenic factor as a major source of greenhouse gasses (GHG) and at the same time increase the capacity of GHG sinks. As such gasses have been identified to be the main contributor to affect atmospheric balances and cause climatic variations, by lessening reliance on fossil fuel and inducing the absorbing capacity of GHG sinks, societies may reduce their ecological footprint and the negative consequences of modern living. Climate adaptation in contrast, refers to the processes that need to be in place for society to be able to adjust to temperature and weather alterations, minimize the damages and make the most of surfacing opportunities. Briefly put, mitigation aims to '*avoid the unmanageable*' and adaptation aims to '*manage the unavoidable*' (Scientific Expert Group, 2007). The need to modulate arising circumstances lies on the single fact that the benefits of adaptation generally outweigh the costs and the cost of inaction would simply be too high for societies to endure (EC, MRAG Report, 2008).The RegioClima project promotes CCA strategies by enhancing '*Regional Cooperation towards Adaptation to Climate Change*'. The strategic guidelines for action that are expected to be

Textbox 1: RegioClima Project Identity

Project Partners

- Lead Partner (LP): Larnaca District Development Agency (Cyprus)
- Partner 1: Veneto Regional Authority (Italy)
- Partner 2: FundaciónComunidadValenciana Region Europea (Spain)
- Partner 3: Estonian Marine Institute, University of Tartu (Estonia)
- Partner 4: Bratislava Self-Governing Region (Slovakia)
- Partner 5: Pays d'Aubagne et de l'Etoile Urban Communities (France)
- Partner 6: Region of Crete (Greece)
- Partner 7: Regional Agency for Entrepreneurship and Innovations of Varna (Bulgaria)

Project Title	Regional Cooperation towards Adaptation to Climate Change
Acronym	RegioClima
Type of Intervention	Regional Initiative Project
Duration	36 months
Budget	1.999.970 €
Official starting date	01 October 2008

promoted by the project will provide a framework of expectation of the impacts of CC (level of impact and possibility of impact) on a regional level, linked to policy recommendations for both minimizing the risk of damage and exploiting new opportunities. At the heart of RegioClima project is the need to facilitate LRAs formulate integrated policies that efficiently foresee and adjust to climatic alterations. Such an approach requires multi-level governance (often involving cross-border cooperation), hence is also based on the sharing of experiences between local authorities, the dissemination of technical input related to CC adaptation and on direct interaction with policy makers.

In order to achieve the best results possible from the implementation of the RegioClima project, a balanced partnership was formed, comprising five LRAs (Spain, Italy, Greece, France; and Slovakia), one academic institution (Estonia), a regional agency for entrepreneurship and innovation (Bulgaria) and a Local Development Agency (Cyprus) (for detailed information see Textbox 1).

Throughout the initial phases of the RegioClima project, priority was given to the study of local, regional and (inter)national adaptation policies to CC, across the European continent. These policies were identified and examined by focusing on three (3) broad geographical regions (North, Central & South Europe), which served as points of reference for implemented CCA policies on a regional level (see Section 1.1). For each of these regions, CCA priorities and strategies at the level of LRAs were identified and analysed in three independent *Climate Change Adaptation Strategy Reports*. These reports are the result of the joint work of project partners from the same broad geographical region with the assistance of external contractors and include an extended policy documentation overview at regional, national and EU levels.

The purpose of this report is to provide EU LRAs with a concise document describing CCA strategic approaches and interventions best suited to the local (regional) context. The report consolidates the findings of the project partners' joint work together with external experts, presented through the three (3) Climate Changer Adaptation Strategy Reports (North, Central & South Europe).Specifically it aims to(i) emphasize the need to adopt CCA strategies, (ii) underline the importance of coordination of CCA strategies of EU LRAs, (iii) assist LRAs in their tasks towards minimizing the risk and level of impacts of CC across EU cities and regions and (iv) explore the potential of and project opportunities of strategic synergies between EU LRAs to adapt to CC (e.g. common opportunities for business development in specific sectors such as tourism, transport, other infrastructure, etc.), (v) identify possible conflicts among the proposed strategies (e.g. interventions in the agricultural sector of the North European region affecting the competitiveness of the same sector in Southern Europe, etc).In brief, this consolidated report promotes multi-level coordination of the response to the phenomenon of CC, by serving as a reference tool in the development and implementation of CCA strategies for European LRAs.

1.1 Geographical Reference: North, Central & South Europe

The broad delineation of three (3) sub-regions (North, Central and South Europe) was decided upon by the project partnership at the design stage of the action, to enhance the efficiency of collaboration, in terms of direct exchange of experiences (based on a common understanding of - in many cases shared - impacts and priorities). At a later stage (during implementation), the project partners with the guidance of external experts, decided on the allocation of EU MS in those sub-regions (Table 1). The accompanying documents of the EC White Paper on CC adaptation and the final report of the PESETA research project (Ciscar, J.C. et al 2009) were also used for that purpose. Moreover, a coordinated involvement of project partners in all three regions was sought, so as to balance out the stronger input of information coming from southern and central regions in comparison with that from the northern regions, which otherwise could potentially lead to biased conclusions.

Table 1. Allocation of EU MS in broad geographical regions as per the needs of the RegioClima Project

Broad geographical region	EU MS
Northern Europe report	Estonia Latvia Lithuania Finland Sweden Denmark
Central Europe report	Slovakia Bulgaria Italy (northern regions) France (northern regions) Romania Hungary The Czech republic Austria
South Europe report	France (southern regions) Cyprus Greece Italy (southern regions) Spain Portugal Malta

It is important to note that countries which are not participating in the RegioClima project, but whose boundaries lie within the suggested sub-regions are also taken under consideration (e.g. Sweden, Finland, Malta etc.). Also, given that the Estonian Marine Institute is the only RegioClima partner in the Northern Europe region, the relevant report was largely based on input provided by experts outside this project partnership.

2. Climate Change Adaptation Policy

2.1 Global policy initiatives and trends

Globally, the pivoting initiative to refer to in relation to CC issues is the United Nation's Framework Convention on Climate Change (UNFCCC), a treaty signed in 1994 and with nearly universal membership. Since then, several other documents have been published and agreements reached in order to keep the debates up-to-date with contemporary technologies and CC theory, like the IPCC report (2007), the Bali Conferences (2007), the Copenhagen (2009) and the Rights of Mother Earth at the Cochabamba Summit (2010). The UNFCCC operates through specific processes, which are clearly outlined to function as a framework for intergovernmental joint action. It fundamentally relies on (i) data accumulation on a national level relating to GHG emissions and removals, (ii) the launching of national mitigation and adaptation strategies and (iii) the cooperation between states in preparing for adaptation to the impacts of CC.

LRAs have their own part in this process, as they play a major role in helping their national governments meet their GHG emission reduction targets and achieve mitigation of the anthropogenic causes of CC (e.g. decisions of the Kyoto protocol included mechanisms that foresaw the participation of both public and private entities). Similarly, in terms of adaptation, local authorities are instructed, or often compelled, to prepare for CC impacts and make best use of the tools, incentives and guidance that are provided by national strategies. Regional -and individual- responsibility for autonomous adaptation to CC is a key principle in the overall success of national strategies.

Although LRAs are not parties of the UNFCCC and only enjoy observer status through eleven (11) Local Government Organisations[1], they largely affect and are affected by the decisions made by the Convention. An effective interaction between LGOs and the UNFCCC Secretariat is accomplished through the Local Government and Municipal Authorities (LGMA) constituency, with Local Governments for Sustainability (ICLEI) being the focal point. Local government associations in the international climate negotiations aim to emphasize the crucial role of cities and LGAs in climate protection and want this key role to be recognized in the post-2012 climate regime (see also Section 2.4).

On an international level, these government organisations act as representatives of local governments in designing and implementing national development plans and adaptation strategies to CC. The drawing of climate resilient and environment friendly growth on a

[1] The eleven (11) government organisations with observer status in COP15: ICLEI (since 1995), Climate Alliance Germany (since 1995), Climate Alliance Austria and Climate Alliance Italy, Federation of Canadian Municipalities (since 2005), Vivre en Ville (since 2005), Energie-Cites (since 2009), Italian Local Agenda 21 Association (since 2009), Network of European Metropolitan Regions and Areas (since 2009), United Cities and Local Governments (since 2009), United States Conference of Mayors (since 2009)

regional level falls very much in the hands of local authorities who are called to not only provide accurate relevant information and set priorities, but also implement innovative action (see Section 2.4). It is clear that well-managed urban areas, in addition to serving as the means in the achievement of national targets, are in a position to adapt faster to shifting circumstances.

2.2 European Union Policy

The EC White Paper 'Adapting to climate change*: Towards a European framework for Action*', which was presented by the Environment Commissioner, on April 1st, 2009, sets the framework for reducing the EU's vulnerability to the impacts of CC. This binding document built on the wide-ranging consultation launched in 2007 through the Green Paper of the EC, on CCA and serves as the response to the need for development of a coordinated strategic approach to this phenomenon. The variation in CC effects and their magnitude from one region to another means that most adaptation measures will have to be adopted on a national, regional or local level. However, these should be supported by a general framework of integrated and coordinated action at an international level. To support this, we can consider the cases of Slovenia and the Czech Republic, MS that very much relied on the publication of the White Paper on CCA, not only to provide guidance in the national debate of adapting to CC, but also to supply the so far absent political emphasis to an issue that requires legislative action. The strategy that is promoted by the EC White Paper is based on the coordination of the regional CCA measures that are adopted in the various sectors of society and between MS. For this, there needs to be a clear delineation of the roles played by different levels of governance (international, national, regional authorities). The White Paper clearly states that, (i) in all sectors, the EU must incorporate CC consequences in EU policies, funds and research programmes, and (ii) there is a need to create a new common European centre, based on the free-flow of information, so as to strengthen the coordination of CCA efforts across EU MS.

Designed to evolve as further evidence becomes available, the objective of the EU's adaptation framework strategy is to maximize the Union's resilience to the impacts of climate change. The framework will respect the principle of subsidiarity and support overarching EU objectives of sustainable development. It adopts a phased approach. The intention is that the 1st Phase (2009-2012) will lay the ground work for preparing a comprehensive EU adaptation strategy to be implemented during Phase 2, which is to begin in 2013. Phase 1 will focus on four pillars of action: (i) building a solid knowledge base on the impact and consequences of climate change for the EU (ii) integrating adaptation into EU key policy areas (iii) employing a combination of policy instruments (market-based instruments, guidelines, public-private partnerships) to ensure effective delivery of adaptation and (iv) stepping up international cooperation on adaptation. As CCA measures can take both bottom-up and top-down approaches, for Phase 1 to be successful, the community, national

and regional authorities must cooperate closely and for this reason the EU functions as a facilitator and coordinator of integrated action.

The EC White Paper 'Adapting to climate change: *Towards a European framework for action*' is based on a five-axis framework. Although adaptation measures are largely taken at a national, regional and local level, due to regional variability and difference on the level of impact across the continent, the following sectors are closely integrated through the single market and common policies of the Union and therefore, require a coordinated response. The five sectors below although they have been independently analysed, it is apparent that there are significant overlaps between them. For example, a deterioration of the quality of drinking water in one area will have effects apart from the water sector, on health, biodiversity, agriculture and as demonstrated around the world in areas with water shortage, important social consequences. Considering the variation between MS in identifying sectors for climate adaptation actions, it is arguable that the difficulty in defining distinct sectors for climate adaptation action is somewhat mirrored in national policy making across the EU.

1. Health and social policies
2. Agriculture and forests
3. Biodiversity, ecosystems and water
4. Coastal and maritime areas
5. Production systems and physical infrastructure

• Health and Social policies

Changing weather conditions are anticipated to have profound effects on human, animal and plant health. As extreme events become more frequent, weather-related deaths and infectious vector-borne transmissible diseases are expected to rise. The anticipated increase in summer temperatures could also lead to a greater risk of sun stroke and dehydration, particularly among the elderly, the young and the sick. The 2008-2013 European Union's Health Strategy foresees such CC adaptation measures to be adopted and provides support to MS, though there is a lack of specification in relation to implementation actions. However, it is clear that these measures should spread the health impacts of CC among the different states and social groups and that also, the quality of life of weaker classes should be taken into account.

• Agriculture and Forests policies

Climate change is one of the main drivers that shape European agriculture and rural areas. Even if EU agriculture is technologically advanced, its capacity to produce food and to contribute to providing ecosystem services is directly dependent on climatic conditions. In this sector, projected climatic changes will mainly affect crop yields (increased risk of failure,

soil erosion, etc.), livestock management, forest health and productivity, fisheries and aquaculture. On the upside, milder winters, longer growing seasons and higher concentrations of CO_2 in the atmosphere are expected to have positive consequences in the northern regions of Europe. In this respect, the Common Agricultural Policy (CAP) of the EC plays a key role in helping farmers to adapt their production systems to the new conditions. Within the White Paper there is a section advising that the CAP considers providing an adequate framework for sustainable production and that MS integrate adaptation measures in the three strands of rural development: (i) improving competitiveness, (ii) the environment and (iii) the quality of life in rural areas.

On the topic of forests, the EU Forestry Strategy could be updated with regards to climate related aspects, so as to include new approaches on forest protection and forest information systems.

• Biodiversity, Ecosystems and Water policies

Ecosystems play a very important role in climate regulation. Coastal areas, wetlands and areas of vast vegetation provide basic ecosystemic services (i.e. carbon sequestration), apart from acting as natural buffers to flooding incidences and erosion. However, the consequences of pollution, the rapid loss of biodiversity and demanding land use practices by industrial agriculture have greatly deteriorated the ability of ecosystems to adapt to new conditions. Fundamental changes in the environment could mean that an invasion of new species is facilitated, which could lead to a further deterioration of ecosystemic balances. A number of MS have already developed policies and measures to address biodiversity loss and water scarcity, but the European Commission believes that a better coordination on an EU level would offer more benefits. The White Paper proposes such measures as better implementation of EU Directives (Floods, Habitats, Natura), uniform regulation of equipment standards, enhancement of water efficiency and sustainable use, interconnectivity of natural areas and better land management.

• Coastal and Maritime Areas policies

A changing climate will largely affect coastal and marine ecosystems that depend on fine balances between terrestrial and marine areas. According to predictions, coastal erosion rates will continue to increase and existing defences may provide insufficient protection to a rising sea level. According to predictions, this is an effect of CC that will continue to occur for at least another 50 years, independently to what mitigating CC strategies are adopted and how well they are implemented. Apart from the loss of coastal areas, the rise of the sea entails the increase of cases where sea water blends with inland fresh water and deteriorates water quality. Changes in salinity and acidity of water reserves are known to have major influences in the flora and fauna of the surrounding ecosystems, however, these are difficult to quantify and indeed predict. Tourism is also likely to suffer from increasing

temperatures in Mediterranean regions; however, temperature rises prolong tourism seasons and will also mean that other regions previously unable to provide tourism facilities can now enter the market. The White Paper recommends implementation of the European marine and fisheries strategies and development of a more coherent and integrated policy for maritime and coastal planning and management.

• Production Systems and Physical Infrastructure policies

Extreme climate events are expected to have vast impacts on the existing infrastructure (buildings, transport, energy and water supply), specifically, posing a threat to densely populated areas. In terms of energy use, warmer winters, extended heat waves and decreased annual precipitation, will all have a direct effect on the supply and demand of energy. Road infrastructure is probable to be effected by shifting patterns in the weather, flooding incidences and soil erosion. The European Strategy for Sustainable Development provides a general framework on which MSs can develop national strategic policies in the sector of production systems and infrastructure, to align with the identified necessities of the Community as a whole. According to the White Paper, a more strategic and long-term approach to spatial planning will be necessary if we are to improve the resilience of existing transport infrastructure and energy systems, on both terrestrial and marine areas.

2.3 National Adaptation Strategies at EU Member States

In order to make an account of the development of the international response to climatic changes, in this chapter we will briefly present which MS have developed and legislated specific National Adaptation Strategies (NAS). As the effects of CC, social and political conditions and economic availability differ from one country to the other, countries of the European Union are at different stages of producing and implementing NAS. By 2005 Finland was the only MS to have developed a NAS, however since the pace of endorsing such strategies in order to tackle the effects of CC has rapidly accelerated. In the following Tables you will find an account of the progress that has been achieved by MS, in terms of implementing NAS or sectoral integrated policies dealing with CCA.

Table 2. National Adaptation Strategies of non EU European countries

Iceland	**Climate Change Strategy, 2007**
Norway	2008
Liechtenstein	-
Switzerland	Expected in 2011

Table 3. National Adaptation Strategies of EU MS

Austria	**NAS expected in 2011**
Belgium	**NAS expected in 2012**
Bulgaria	**-**
Czech Republic	**2009**
Cyprus	**-**
Denmark	**2008**
Estonia	**-**
Finland	**2004**
France	**2006**
Germany	**2008**
Greece	**-**
Hungary	**2008**
Ireland	**Climate Change Strategy, 2007**
Italy	**Climate Change Strategy, 2007**
Latvia	**-**
Lithuania	**-**
Luxembourg	**-**
Malta	**-**
The Netherlands	**2008**
Poland	**- (Adapting to Soil erosion & Droughts in Agriculture and Forestry)**
Portugal	**2010**
Romania	**-**
Slovakia	**- (Water Management Adaptation Strategy, 2009)**
Slovenia	**- (Agricultural Adaptation Plan, 2008)**
Spain	**2006**
Sweden	**2009**
United Kingdom	**2008**

2.4 EU Local and Regional Authorities

Following international guidelines and national requirements, several regional authorities across the EU have taken initiative action, so as to address the problem of adapting to a changing climate. As has been argued throughout this report, LRAs have their own unique role to play in this process. We saw in chapter 2.1, that there are eleven government organisations that operate in the IPCCC, serving as representatives of the various LRAs. However, these organisations function not only as delegates of local authorities in the Convention, but also implement an active approach towards coordinating local government associations and networks around the world. They aim to collecting the available data and

making best use of operative techniques without having to go through the extensive formalized procedures of international cooperation. Additionally, to these organizations, various processes have been set up by regional authorities to accompany and follow-up international CC debates, such as the joint process of the Local Government Climate Roadmap (adopted in Bali, COP 13), which is driven by leading LGOs. The Roadmap is based on disseminating regional CCA approaches and aims at mobilizing local authorities across the world to develop efficient adaptation strategies by strengthening cooperation between them. This is mainly achieved by a continuous flow of high levels of input to the negotiations provided by each involved actor. Moreover, joint advocacy processes between LRAs are promoted by several documents: the 'World Mayors and Local Governments Climate Protection Agreement' of Bali (COP13), the 'Cities, Local Authorities and Climate Change' decision of in Poznan (COP14), the Dunkerque 2010, Call on Climate Action'(COP16) and the Dunkerque 2010 Local Sustainability Declaration

Innovative action by LRAs however, extends to more than coordinating projects, disseminating results and forming alliances. As mentioned in section 2.1, it is through cities and local authorities that MS can reach their national adaptation and mitigation targets, as they are identified by each NAS. For this reason, LRAs need to realize their full potential in adapting to altering climatic conditions and adopt innovative techniques that are developed through concise research on the impacts of CC and their own adaptive capacity. In the Textbox below, three examples of innovative action developed by regional and local authorities (Valencia region, Spain; Calvia municipality, Spain; and Valga municipality, Estonia) are presented.

Picture 1. Passive house standard achieved at Valga Municipality (source: ICLEI)

Textbox 2. Examples of innovative action developed by LRAs

- **Valencia**, Spain, demonstrates a successful case of innovative action deriving from LRAs (http://www.uegva.info/). In 2007, it established the Regional Ministry of Environment (RGE), a Directorate General devoted to CC issues, water resources and urbanism. Among the basic objectives of the RGE, is to promote research and development in the field of environment by increasing participation in the 7th European R&D Framework Programme (2007-2013). The Region has also produced a Valencian Strategy for the period 2008-2012, which includes 125 suggested actions, focusing on both mitigating and adapting to CC (Generalitat Valenciana 2008).

- In **Calvià** (Mallorca, Spain), the Climate Change Office (CCO) has been operative since 2007. The main objective of the CCO is to organize the development of a local strategy against CC and the coordination of all sustainability policies. It is generally occupied with environmental education and reducing energy demands, cleaning of beaches, protecting the natural environment and water conservation projects. The CC Office's work begun by carrying out primary research on the region, which eventually lead to the adoption and implementation of both mitigation and adaptation measures against CC. As the municipality of Calvià is a member of the "City for Mobility Network", a global network for the promotion of sustainable urban mobility, the delineation of the strategy against CC for the Spanish city is largely impacted by the input and recommendations of other members of the network. This goes to show the growing importance of the role of LRAs in issues of CCA, as well as the ever-increasing value that is being attached to regional cooperation and the exchange of knowledge and technologies.

- The municipality of **Valga** in Estonia implemented the first national passive-house renovation pilot project (Picture 1), which focused on saving more than 90% of the energy consumed by a kindergarten building (Oja, A. & E. Römpczyk 2008; ICLEI 2011). Although the project has strong links with mitigating CC, passive houses are also closely linked with adapting to CC, as they seek to acclimatize to their environment by making best use of the thermal, hydraulic and geological conditions of the area that surrounds them. Estonia has a national energy conservation plan in action, hence the innovative initiative implemented by Valga municipality may help towards enforcement of improvements in buildings. The energy saving project is a concrete action of both mitigation and adaptation strategies that indicates the importance of LRAs in drawing national priorities and implementing strategic plans to address changes in the climate.

3. Regional Climate Change Adaptation Priorities

3.1 Identifying Regional Priorities

In the framework of the current strategy report, information on the regional CCA priorities has been processed in line with the 5 axes of interest in adapting to a changing climate in Europe that are delineated in the White Paper. Moreover, these axes have been broken down to sub-sectors of sectoral priorities. On the basis of the input provided by the project partners and selected CCA stakeholders through the use of questionnaires and semi-structured interviews, the sectoral priorities have been summarized and are presented in Table 4.Initial information has been filtered to only feature priorities which have been identified as important by at least one partner/expert, and thus, the added value of the Table dwells on the reduction of the scope of adaptation strategies into a number of selected sectoral priorities.

Table 4 quantifies the **significance of expected CC impacts** by measuring *two* indicators: (i) the possibility of impact and (ii) the level of impact. The possibility of impact for each of the sub-sectors that appear in the left hand column is graded from A to E, with 'A' disclosing a small and 'E' a very high *possibility* of impact. Similarly, '0' shows a small *level* of impact and '4' one with dire consequences. Thus, the significance of impact for each event ranges from A0 (small possibility of impact with minor effects) to E4 (high possibility of impact with important effects). In order to easily discern the sectors that are commonly regarded as high priorities by most partners, three levels of significance are distinguished by colour (yellow=low priority, green=medium priority, red=high priority). Therefore, the distribution of colours in Table 4, reveals which effects of CC is perceived as most important -according to the significance of the impact indicators- and it will be therefore suggested by this report to take further steps to harmonizing them. The data on the table below is presented vertically by sector, which is further broken down to the sub-sectors and horizontally by MS, thus providing detailed information on how different regions perceive and tackle expected impacts of CC.

The figures that are presented in Table 4, derive mainly from both primary and secondary research of regional and sectoral CC provisions. Qualitative data was collected through (i) interviews with key policy stakeholders in most MS, (ii) the completion of country-focused questionnaires and (iii) report sheets for sectoral assessment[2].

[2] Detailed information on the work concluded by the REGIOCLIMA partners is available on www.regioclima.eu

Table 4. Significance of Impact of CC effects for South, Central & North Europe

	Probability: A= low, B, C, D, E=very high **Level:** 0= low,1, 2, 3, 4=very high	**Significance of Impact per Country**																		
	Sector Sub sector	**South Europe**					**Central Europe**								**North Europe**					
		Cy	Gr	Sp	Ita	Fr	Bu	Fr	Ita	Slo	Cz	Aus	Hu	Rom	Den	Sw	Fin	Est	Lat	Lith
1	**Health**																			
1.1	Increase of patients	C2	D3	D2	C2	E4	C3	E4	D2	C2	D3	C2	C2	D2	C2	C2	C2	C2	N/A	C2
1.2	Air pollution	C2	D3	D3	C2	E4	C3	D2	D2	B1	E2	B2	C2	C2	C2	A0	N/A	A0	N/A	A0
2	**Social policies**																			
2.1	Migration	D3	B1	B1	C2	A0	C2	C0	C2	B0	C1	B1	B2	C2	N/A	N/A	N/A	C2	N/A	A0
2.2	Social inequality, vulnerable population[3]	A1	C2	B1	A2	A0	C2	A0	C2	C1	B1	A1	B1	C2	N/A	N/A	N/A	N/A	N/A	A0
3	**Agriculture**																			
3.1	Reduction of crop productivity due to heat stress	D3	C2	E3	C2	E3	C3	B3	C3	C2	C3	C3	C4	B2	C2	E4	C2	C2	N/A	E4
3.2	Soil degradation due to unsustainable uses of land	D3	C2	E3	C2	E3	B3	C3	C2	D2	C2	C1	D3	C2	C2	N/A	C2	C2	N/A	C2
3.3	Irrigation problems	D3	C2	E3	C2	E3	D3	B2	C2	D2	D2	C2	D2	D4	C2	C2		C2		C2
3.4	Increase in flood risk	A0	C2	D3	D3	D2	E4	D2	C3	D3	E4	D4	E4	E4	C2	N/A	N/A	C2	N/A	C2
4	**Forests**																			
4.1	Flooding	D3	C2	D2	C2	E3	D3	B3	C2	D2	B2	C1	D1	D2	C2	C2	C2	C2	N/A	C2
4.2	Loss of forest land	D3	C2	D2	C2	E3	C3	E3	B2	C2	B2	A1	B1	C2	C2	N/A	C2	C2	N/A	C2
5	**Ecosystems**																			
5.1	Depletion/loss of habitats	D3	C2	D3	C2	D3	D3	D3	C3	C1	C2	C2	C1	C2	N/A	E4	C2	C2	N/A	C2
5.2	Soil erosion	D3	C2	D3	A2	D3	C4	B2	C3	D3	C4	C4	D4	D4	N/A	C2	C2	D2	N/A	C2

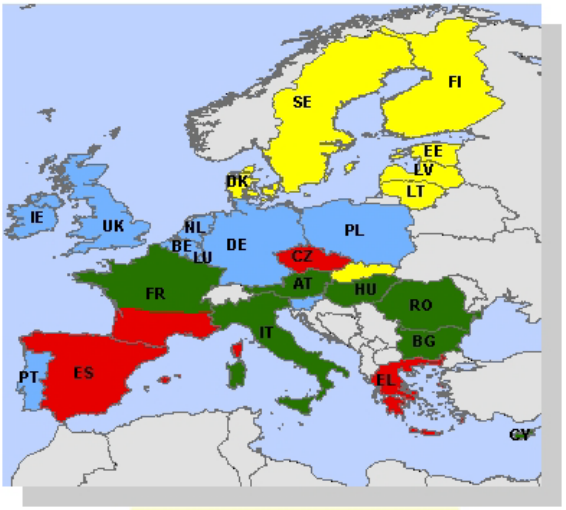
[3] The North Europe survey focuses on criminality

	Probability: A= low, B, C, D, E=very high **Level:** 0= low,1, 2, 3, 4=very high	**Significance of Impact per Country**																		
	Sector Sub sector	**South Europe**					**Central Europe**								**North Europe**					
		Cy	Gr	Sp	Ita	Fr	Bu	Fr	Ita	Slo	Cz	Aus	Hu	Rom	Den	Sw	Fin	Est	Lat	Lith
5.3	Urban environment	D3	C2	D3	C2	E4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	**Biodiversity**																			
6.1	Species extinction	C2	C2	D3	C2	E4	C3	E4	C3	C1	C2	B2	C1	C1	A0	E4	C2	E2	N/A	E4
6.2	Changes in species distribution (species migration)	C2	C2	D3	C2	E4	C3	D4	C3	B1	C2	C2	B1	B1	C2	E4	C2	E4	N/A	C2
6.3	Fish-stocks	E4	C2	D3	C2	C2	C2	D2	C2	N/A	N/A	N/A	N/A	C2	E4	E4	C2	C2	N/A	
6.4	Niche limitations	C2	C2	D3	C2	E4	D3	D4	C3	C1	C2	C2	C1	C1	N/A	E4	C2	C2	N/A	C2
7	**Water**																			
7.1	Water scarcity	E4	D3	E4	E2	D2	D4	E2	C3	C2	C4	C2	D4	E3	C2	C2	A0	C2	E4	C2
7.2	Droughts	E4	D3	E4	C2	E2	D3	E2	C2	C2	C2	C2	D2	E4	C2	C2	C2	C2	E4	C2
7.3	Deterioration of freshwater quality (salinity/pollution)	E4	D3	E4	E2	D2	D4	D2	C3	C2	D4	B2	D4	D3	C2	C2	C2	E4	E4	C2
7.4	Desertification (loss of groundwater reserves)	E4	D3	E4	C2	E2	D4	D2	D3	C2	C4	C2	E4	D3	C2	A0	N/A	N/A	E4	C2
7.5	Flooding	E4	D3	E4	C2	D2	E4	C2	D3	D2	E4	D2	E4	E3	C2	C2	C2	E4	C2	C2
8	**Coastal and maritime areas**																			
8.1	Extreme weather events	D3	D3	C4	E2	C1	D3	D1	D3	N/A	N/A	N/A	N/A	D3	C2	E4	C2	E4	C2	C2
8.2	Coastal erosion	D3	D3	E4	E4	E2	E3	E2	D2	N/A	N/A	N/A	N/A	E3	C2	E4	C2	E4	E4	E4
8.3	Sea level rise	C2	C2	E4	C0	E4	C2	E4	D2	N/A	N/A	N/A	N/A	C2	C2	C2	C2	E4	C2	C2
8.4	Fisheries	E4	C2	D3	C2	C2	C2	C2	C2	N/A	N/A	N/A	N/A	C2	C2	E4	C2	E4	N/A	C2
9	**Production systems & physical infrastructure**																			
9.1	Increase in energy demand	D3	E4	E3	E4	E4	D3	E4	D3	C3	C3	D1	B2	C2	C2	E4	C2	N/A	N/A	C2
9.2	Energy infrastructure	D3	E4	C1	C2	E4	D3	E4	D3	D2	C2	B1	C2	D2	C2	E4	C2	C2	N/A	A0

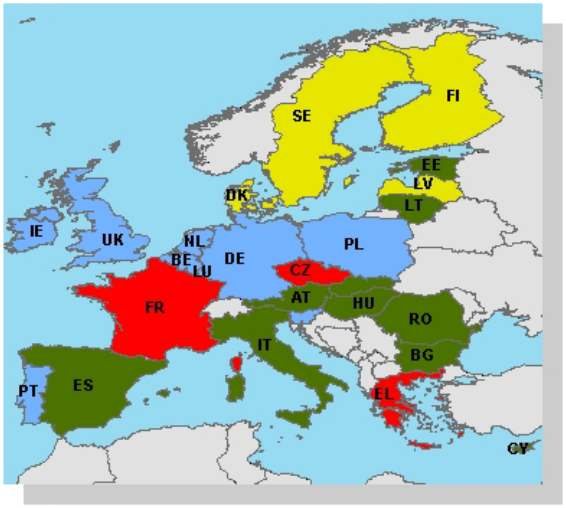
	Probability: A= low, B, C, D, E=very high **Level:** 0= low,1, 2, 3, 4=very high	**Significance of Impact per Country**																	
	Sector Sub sector	**South Europe**					**Central Europe**								**North Europe**					
		Cy	Gr	Sp	Ita	Fr	Bu	Fr	Ita	Slo	Cz	Aus	Hu	Rom	Den	Sw	Fin	Est	Lat	Lith
9.3	Food production systems	N/A	C2	B1	C2	A0	D3	D2	C2	C2	C2	B1	C2	C3	N/A	E4	C2	C2	N/A	A0
9.4	Telecommunication systems	C2	C2	C2	A2	D3	D3	D3	C2	B2	C2	C2	C2	C3	C2	C2	C2	A0	N/A	C2
9.5	Harbours	D3	D3	C2	C2	D3	D3	B2	C2	N/A	N/A	N/A	N/A	D3	N/A	E4	N/A	A0	N/A	C2
9.6	Airports	N/A	D3	C2	C2	D3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	E4	N/A	A0	N/A	C2
9.7	Transport / Communications infrastructure	C2	C2	C2	C2	D3	D3	D3	C2	C2	D2	C2	D2	D3	C2	C2	C2	A0	N/A	C2
9.8	Risk of collapse for the insurance system in case of extreme damages	D3	B1	D3	C2	D3	C2	D3	C2	D1	D2	D2	D1	C3	N/A	N/A	N/A	N/A	N/A	N/A
9.9	Risk of banking system collapse due to prolonged power failure	D3	C2	B2	C2	D3	C3	B3	C2	B2	B2	B1	B1	B2	N/A	N/A	N/A	N/A	N/A	N/A
9.10	Tourism	E4	D3	D2	C0	D4	D2	E4	C2	D2	C2	C4	D3	E3	N/A	C2	N/A	C2	N/A	A0

3.2 Health and Social policies

Sector: Health & Social Policies



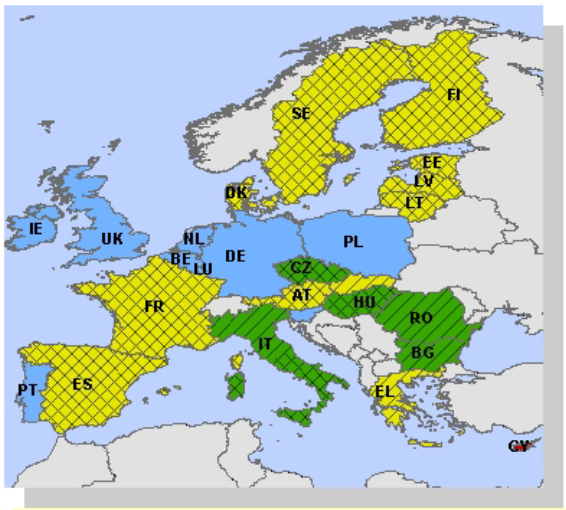
Map 3.1.2: Air Pollution



Map 3.1.1: Increase of patients

A0, A1, A2, B0, B1. C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4

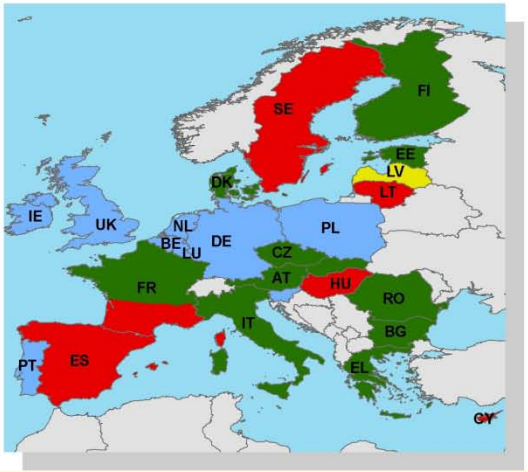
Social inequality, vulnerable population
A0, A1, A2, B0, B1. C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1



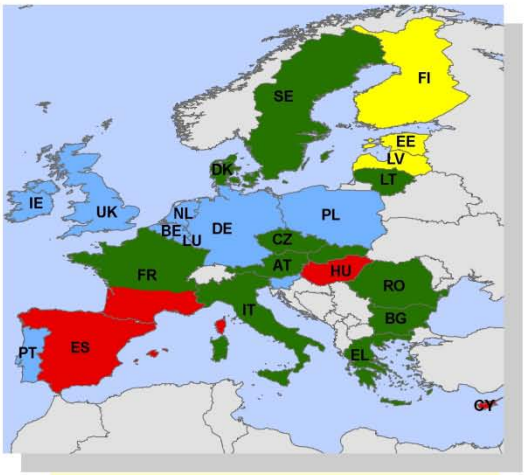
Map 3.1.3: Migration & Social inequality, vulnerable population

3.3 Agriculture and Forest policies

Sector: Agriculture & Forests



Map 3.2.1: Reduction of crop productivity

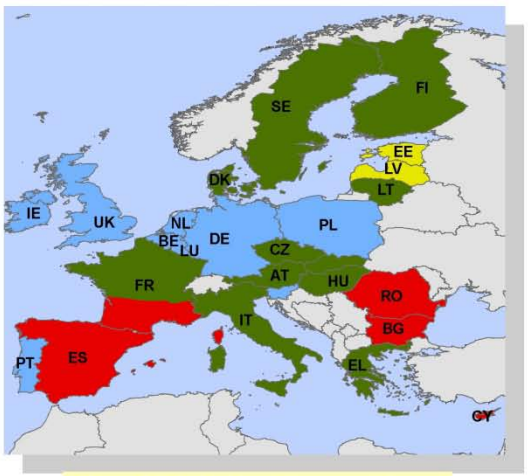


Map 3.2.2: Soil degradation due to unsustainable uses of land

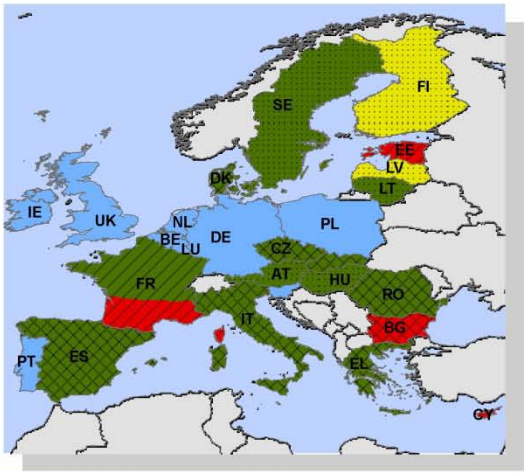
A0, A1, A2, B0, B1. C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4

Loss of Forest land

A0, A1, A2, B0, B1. C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4



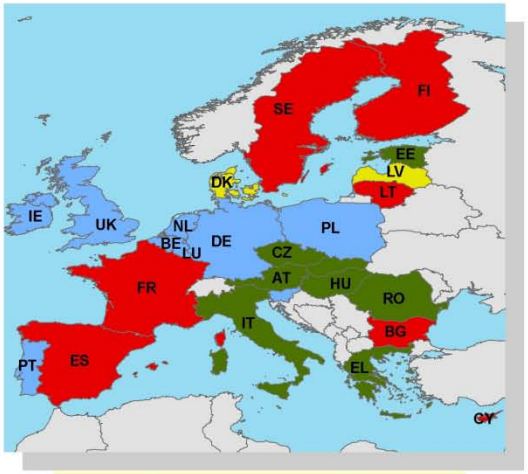
Map 3.2.3: Irrigation problems



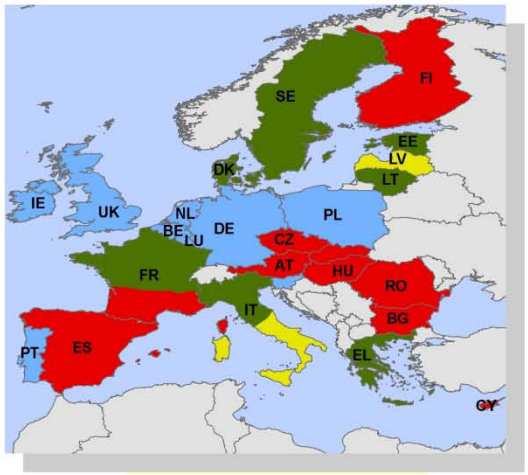
Map 3.2.4: Flooding & Loss of Forest land

3.4 Biodiversity and Ecosystems policies

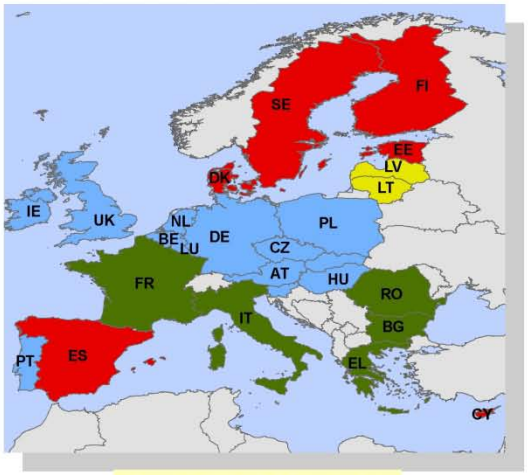
Sector:
Biodiversity & Ecosystems



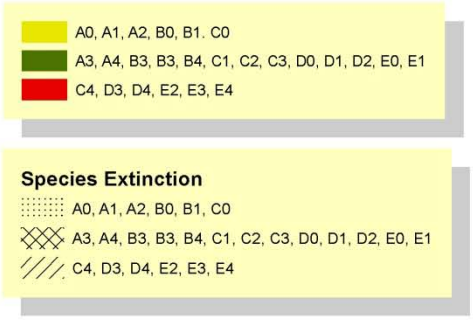
Map 3.3.1: Depletion of Habitats

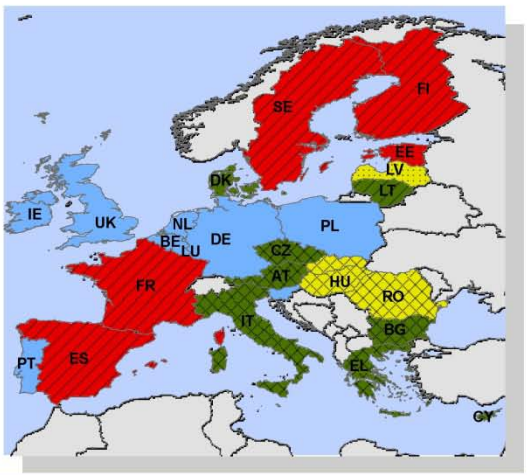


Map 3.3.2: Soil erosion



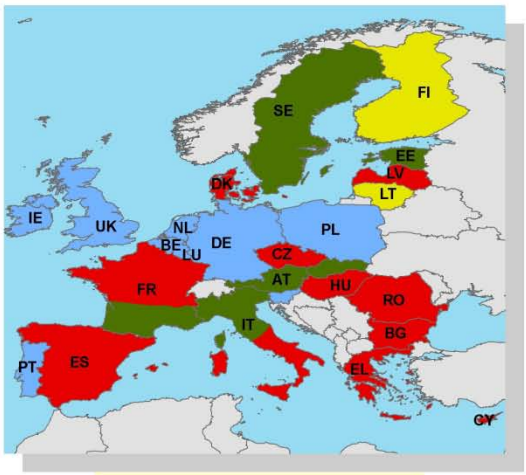
Map 3.3.3: Fishstocks



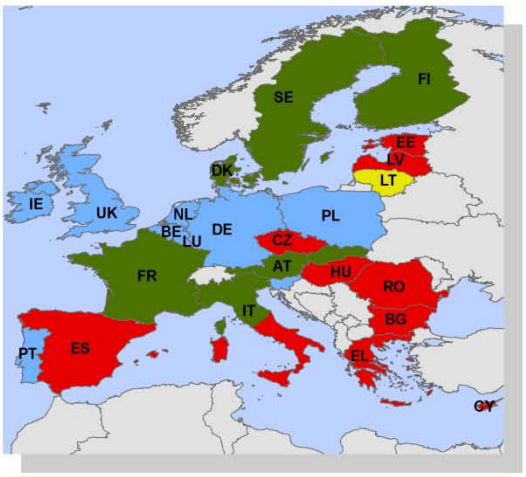


Map 3.3.4: Changes in species distribution & Species Extinction

Sector: Water



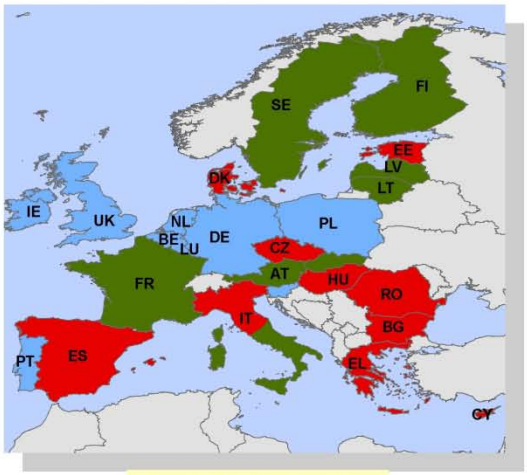
Map 3.4.1: Water scarcity



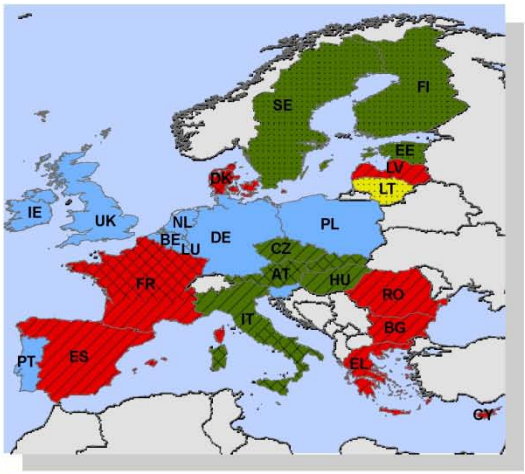
Map 3.4.2: Deterioration of freshwater quality

A0, A1, A2, B0, B1, C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4

Dessertification
A0, A1, A2, B0, B1, C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4



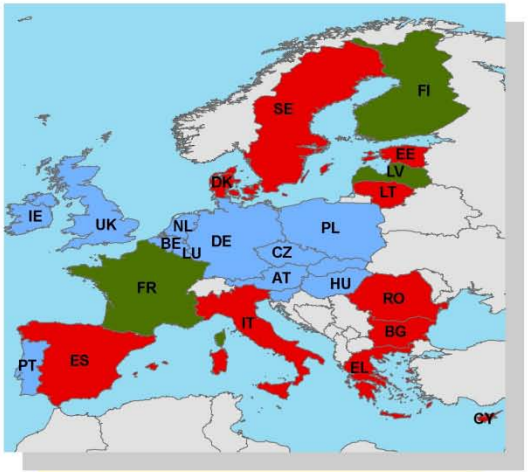
Map 3.4.3: Flooding



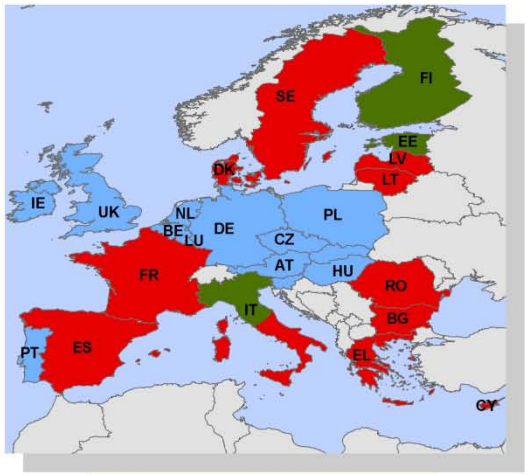
Map 3.4.4: Droughts & Dessertification

3.5 Coastal and Maritime Areas policies

Sector:
Coastal & Maritime Areas

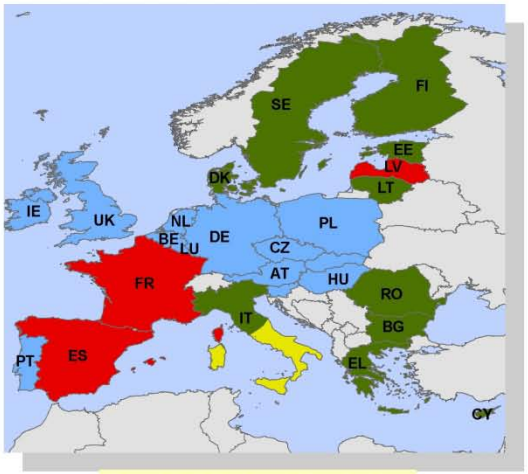


Map 3.5.1:Extreme weather events

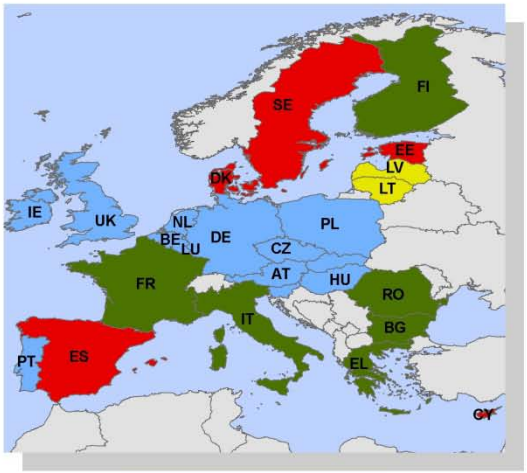


Map 3.5.2: Coastal erosion

A0, A1, A2, B0, B1, C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4



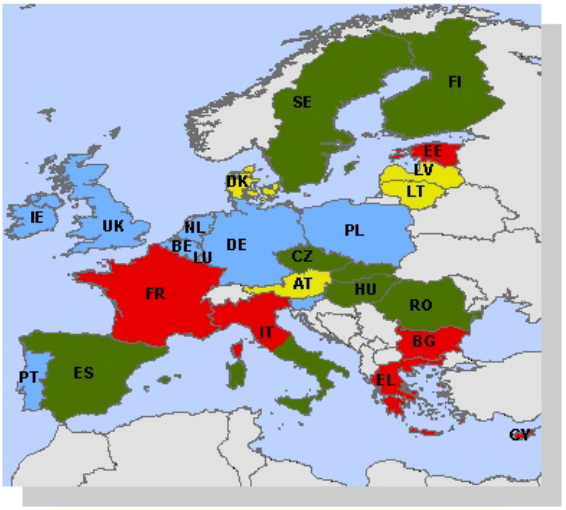
Map 3.5.3: Sea level rise



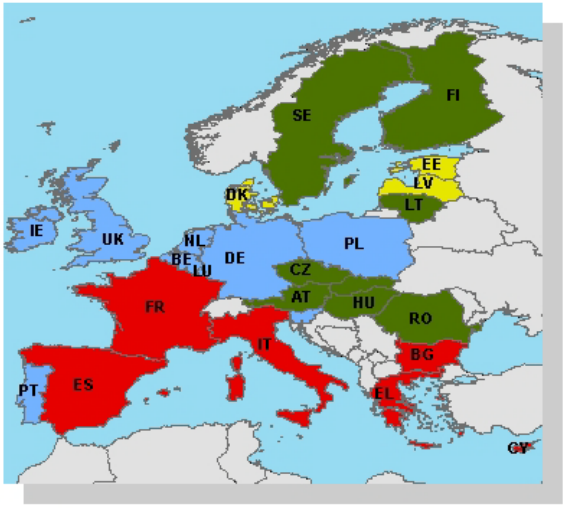
Map 3.5.4: Fisheries

3.6 Productions Systems and Physical Infrastructure policies

Sector: Production systems & physical infrastructure

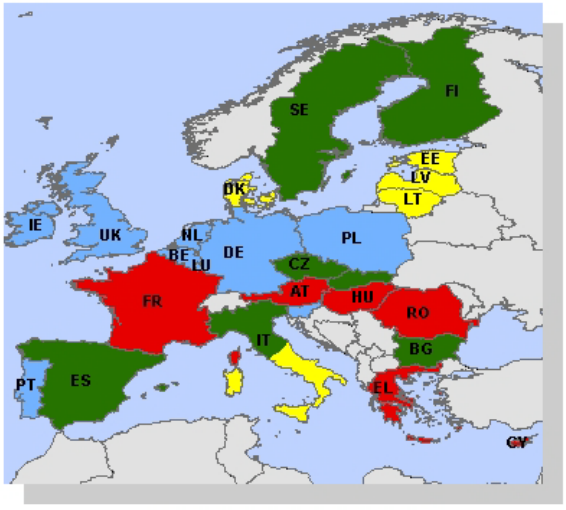


Map 3.6.2: Energy Infrastructure



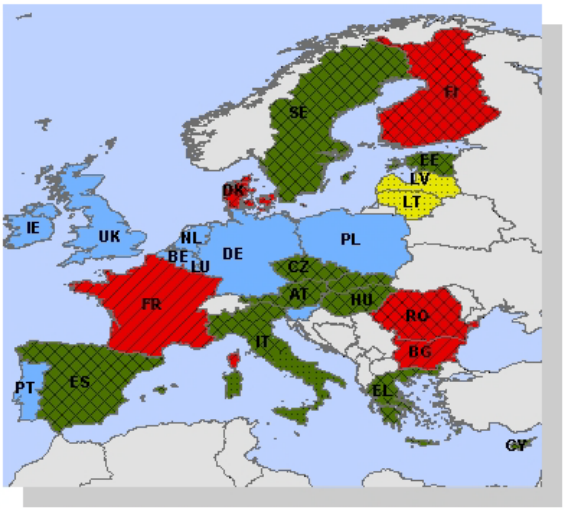
A0, A1, A2, B0, B1, C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4

Map 3.6.1: Energy demand



Map 3.6.3: Tourism

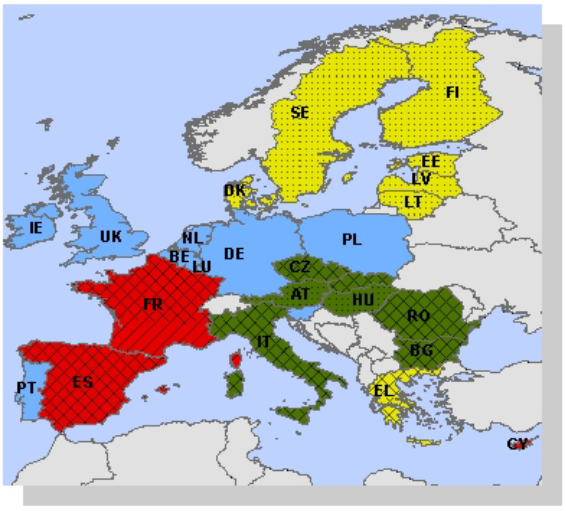
Sector: Production systems & physical infrastructure



Map 3.6.4: Telecommunication systems & Transport systems

A0, A1, A2, B0, B1, C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4

Banking - Telecommunication systems
A0, A1, A2, B0, B1, C0
A3, A4, B3, B3, B4, C1, C2, C3, D0, D1, D2, E0, E1
C4, D3, D4, E2, E3, E4



Map 3.6.5: Insurance system & Banking system

3.7 Regional Priorities in selected EU Member States

Regional priorities are briefly analysed based on the findings of the surveys and desk research that was carried out by the project partners. These are presented below, based on a per thematic sector analysis. The set of priority policy fields which was identified across different geographical zones in Europe (Table 4), has resulted from specific Regional Priorities for selected EU MS; these are summarised in Annex I.[4]

Health

Both Increase of patients and air pollution due to climate change is considered a major issue by stakeholders in Greek, French and Slovak regions. In the studied southern and central Europe regions, both issues ares considered a likely event with considerable magnitude, contrary to the information collected from most of the northern regions (all regions as regards air pollution), where they are seen as issues of minor importance.

Other social issues like migration, social inequality and vulnerability of population are considered less important in all surveyed regions, with the exception of Cyprus; stakeholders in the EU Balkan countries, in Italy, Hungary and Slovakia regard these issues as moderate priority.

Agriculture and Forests

The impact of climate change on crop productivity is deemed a major issue in Spain, Cyprus, Hungary, Sweden, Lithuania, and partly in France, and a moderate issue in all other surveyed regions, with the exception of Latvia. The situation is similar for south and central Europe regions, as regards soil degradation due to unsustainable uses of land; in northern regions, it is considered a less important issue (moderate in Sweden, Lithuania and Denmark).

The impact of climate change on flooding is regarded as a high priority in Cyprus, Bulgaria and Estonia (also partly in France) and a moderate priority in all other surveyed regions (with the exception of Finland and Latvia). Loss of forest land is a major priority in Estonia and France contrary to all northern Europe regions (but in Denmark); it is a moderate issue in most other regions.

Biodiversity and Ecosystems

Habitats depletion is expected to be strongly impacted by climate change in most surveyed regions of northern Europe (moderate importance in Estonia and limited in Latvia), as well as in Spain, France, Bulgaria and Cyprus. In all other areas it is considered a moderate issue. Climate change effects on soil erosion are considered high priority in all surveyed central European regions (with the exception of Italy and partly France), as well as in Spain, Cyprus , climate change on changes in species distribution and species extinction is deemed likely and significant in Spain, France, Estonia, Finland and Sweden; in all

[4] The priority policy fields have been identified through both primary and secondary sources, i.e. input collected from surveys carried out by the project partners (involving only a limited number of policy makers and experts) and information extracted from relevant reports and studies (a detailed list of references is provided in section 6 of this report).

other areas it is a moderate priority issue (with the exception of Latvia – both issues are insignificant, Hungary and Romania – changes in distribution are insignificant).

Water

In southern and central European regions, climate change effects on both water scarcity and the deterioration of freshwater quality are regarded as high priority issues, with the exception of Slovakia, Austria, Italy and France, where these issues are of moderate importance (water scarcity is regarded as highly important also by some stakeholders in France). Water scarcity is significant in Denmark and Latvia, contrary to Lithuania and Finland; deterioration of freshwater quality is highly important in Estonia and Latvia, but not at all in Lithuania.

Flooding as a climate change impact is a major issue in most of the surveyed regions in southern and central Europe (moderate in France, Slovakia and Austria); in northern Europe regions it is a moderate priority (high in Estonia and Denmark). A similar situation appears in northern Europe for other water related issues, such as droughts and desertification (with Latvia and Denmark being the exception and desertification being considered insignificant in all areas but in Latvia and Denmark). Both issues are significant in south east and west European regions, while they are deemed a moderate priority in Italy, Slovakia, Austria, Hungary and the Czech Republic.

Coastal and Maritime areas

The effects of climate change on extreme weather events and on coastal erosion are regarded as highly important in all surveyed regions, with the exception of Finland, France and Latvia for extreme weather and Finland and Estonia for coastal erosion. CC impacts on sea level rise and on fisheries are a moderate priority for most surveyed areas; sea level rise is a major issue in Spain, France and Latvia, while fisheries for Spain, Cyprus, Estonia, Denmark and Sweden (fisheries are insignificant in Latvia and Lithuania).

Production systems and Physical infrastructure policies

The impact of climate change on energy demand is deemed significant in all southern Europe regions and a moderate issue in Central Europe (still highly important in Italy and France). In northern Europe it is a less important aspect. CC effects on energy infrastructure are considered a significant issue in Cyprus, Greece, Bulgaria, France, Italy and Estonia and a moderate issue in all other surveyed areas, except from Austria, Denmark, Latvia and Lithuania (where deemed insignificant).

Climate change impact on tourism is a high priority in Cyprus, Greece, France, Austria, Hungary and Romania; it is a moderate priority for all other south and central Europe areas, as well as for Sweden and Finland.

Impacts on telecommunication systems are regarded as a moderate issue in most surveyed regions, with the exception of France, Bulgaria, Romania, Denmark and Finland (high priority issue), as well as Latvia and Lithuania (insignificant issue). The effects on transport are an issue of moderate priority in all areas but France (high priority), Latvia and Lithuania (insignificant issue).

Climate change effects on the insurance system are deemed important in Spain, France and Cyprus, insignificant in all northern Europe, and of moderate priority in the remaining areas. Impacts on the banking system are insignificant in northern Europe and of moderate importance in the remaining areas

4. Regional Climate Change Adaptation Strategies

The EU and its MS have undertaken proactive adaptation actions by developing strategies based on future climate change projections, with a number of EU MS having adopted national adaptation strategies or being in the process of doing so (see section 2.3). At the sub-national level, few climate-related strategic initiatives have already been taken, combining both mitigation and adaptation measures (e.g. in the autonomous region of Valencia, the city of London, etc.).

The CCA strategies developed for the regions of each of the three targeted geographical sub-regions (North, Central and South Europe) made use of data and approaches included in relevant past initiatives, but also collected and assessed input from stakeholders at all relevant levels (EU, national, regional and local) to deliver a framework of recommendations for the regions concerned. A consolidated presentation of the proposed approach for the development of CCA strategies is provided in the sections that follow.

4.1 Climate Change Adaptation- types, factors, measures

CC Adaptation can be geared either to reduce the potential impacts of effects of climate change on natural and human systems and our general vulnerability to climate change ('the degree to which a system is susceptible to, and unable to cope with, adverse effects') – or to *increase adaptive capacity,* i.e. "the ability of a system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences"[5].

As regards policies related to climate change, various types of adaptation can be distinguished: The *anticipatory adaptation,* the *autonomous adaptation* as well as the *planned adaptation.* The *anticipatory adaptation* takes place before impacts of climate change are observed, whereas *autonomous adaptation* does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems. In contradictory to these two approaches, *planned adaptation* is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state[6].

4.1.1 Key adaptive capacity support factors

Key factors for adaptive capacity support are:

- Economic resources – e.g. financial resources from individuals and municipalities;
- Technology – e.g. effective modelling of climate change;
- Information/Awareness – e.g. research programmes in climate change;
- Skills/Human resources – e.g. trainings, seminars, sharing of knowledge;
- Natural resources – e.g. healthy ecosystems that help mitigate climate change;

[5] idem
[6] IBS Europe (2011), CCA Strategy report - Central Europe, section 5.1, InterregIVc 'Regioclima' project.

- Infrastructure – e.g. systems enabling efficient response (wireless network, etc.);
- Institutional support/Governance – e.g. policies at government or non-government level.

4.1.2 Regional authorities and other stakeholders

In order to ensure broad adaptation to climate change further than the capacity which regional authorities show, it is obligatory to highlight the increased adaptive potential of other key actors as well. This includes central government, local administration, non-state organisations such as private business and NGOs as well as the general public. Within the context of the REGIOCLIMA project, it is assumed that it is the regional authorities who undertake the initiative to mobilize the other actors. This can be done by utilizing the methods depicted in the table below, next to the relevant arrows.

	ACTIVITY / ADMINISTRATION	CONTINUOUS / REGULAR	RESERVE / EMERGENCY
LOBBYING	**CENTRAL GOVERNMENT**	1	2
IMPLEMENTATION	**REGION**	3	4
COLLABORATION / SUPPORT	**LOCAL ADMINISTRATION**	5	6
INVITATION / SUPPORT	**NON-STATE ORGANISATIONS (Private Business and Social Entrerprises / NGOs)**	7	8
INFORMATION / AWARENESS	**GENERAL PUBLIC**	9	10

4.1.3 Climate Change Adaptation measures

The following types of measures and actions are distinguished:

(1.) Anticipatory (adaptation that takes place before impacts of climate change are observed. Also referred to as proactive adaptation) vs. *reactionary* (to take action to alleviate impacts after it occurs)

An example of an anticipatory measure is *funding of research and development*. By this measure, each country has the possibility to focus on its own vision of future energy requirements, whether that means concentrating on renewable sources, nuclear energy, fusion, carbon storage as well as conservation or searching for new and more exotic opportunities. These resources should be spent on: research of all sorts (explanatory and applied),pilot programs to test and demonstrate promising new technologies, public-private partnerships to incentivize private-sector participation in high-risk ventures, training programs to expand the number of scientists and engineers working on a wide variety of energy research and development projects,

government-procurement programs that can provide a predictable market for promising new technologies, prizes for the achievement of important technological thresholds, multilateral funds for collaborative international research; international research centres to help build a global innovation capacity, policy incentives to encourage adoption of existing and new energy-efficient technologies which in turn foster incremental learning and innovation that often lead to rapidly improving performance and declining costs.

(2.) Defensive/mitigative (measures that seek to lessen or negate negative impacts) vs. *opportunistic* (measures that seek to strengthen or exploit advantageous impacts)
Most strategies currently anticipate climate change adaptation measures taking place incrementally, as a slow and low cost change building on the existing infrastructure. A significant change would also require a transformational, cultural shift within the existing organisations. Measures which seek to lessen or negate negative impacts depend on the rate of change of these features.

4.1.4 Climate Change Adaptation services

Adaptation services are emerging at the same time that governments, businesses, and communities worldwide are recognizing the need to address current and potential climate change impacts. The *Pew Centre on Global Climate Change* and the *Pew Centre on the States* identified the common elements in terms of methodology, or processes, for confronting climate change impacts in their report entitled *'Climate Change 101: Understanding and Responding to Global Climate Change'*[7]**.** Such elements touch on the following areas:

4.1.4.1 Local perspective on adaptation processes

The state-of-the-art practices show that systems affected by climate change are best managed on the regional and local level. Nevertheless, practical assessments indicate that the sustainability of local measures dealing with climate change will be limited unless they are supported or enacted in concert with state and national level actions. Some local measures, for instance, may be constrained by limited knowledge of interactions with processes operating at larger scales, or by lack of control over and/or access to emissions-reducing measures and technologies[8].

4.1.4.2 Involvement of key stakeholders

All relevant stakeholders should be involved not only in the planning phase, but also in identifying problems and solutions. These should preferably come from all government levels – from national to local, from research and academia background, and from private and NGO sector. Their collaboration requires creativity, thinking out-of-the-box, ability to compromise and work jointly with actors from

[7] IBS Europe (2011), CCA Strategy report - Central Europe, section 5.1, InterregIVc 'Regioclima' project.
[8] Irene Lorenzoni and Nick F. Pidgeon, Public views on climate change: European and USA Perspectives, Centre for Environmental Risk and Tyndall Centre for Climate Change Research, Zuckerman, Institute for Connective Environmental Research, School of Environmental Sciences, University of East Anglia, UK.

different areas. In order to better understand the past, present and potential climate trends, experts from different sectors must be involved as well.

4.1.4.3 Key vulnerabilities & Prioritization of adaptive measures

There are a number of key vulnerabilities that have to be comprehended in order to identify areas most at risk. They can be described in terms of exposure, sensitivity and adaptive capacity.

Priorities must be made for vulnerable systems that will reflect the nature of current and potential impacts of climate change. The criteria published by the Intergovernmental Panel on Climate Change help identify key vulnerabilities that should be considered.

There are varying degrees of certainty and vulnerability involved for each adaptation option. In order to choose an appropriate option, the following criteria should be considered: *No–regret*, *Profit/Opportunity*, *Win–Win*, *low–regret*, *Avoiding unsustainable investments* and *Averting catastrophic risk*.

4.2 Strategic Environmental Assessment: definitions and legislation

The need to develop more effective environmental protection instruments lead the EU to the adoption of the Environmental Impact Assessment (EIA) Directive of 1985[9], offering thus the tools for the EU Member States to perform better controls before and during the implementation of public and private projects such as highways, factories, ports, large-scale infrastructure or industry projects.

In the course of time, it was evident that an environmental impact assessment was necessary also for the level of planning and programming, as the EIA purely for projects was not sufficient as an environmental protection instrument. The Strategic Environmental Assessment (SEA) Directive, adopted by the EU in 2001[10], foresees that national, sectoral and local decision-makers have to assess the potential environmental impacts of their decisions, plans and programs and provide the basis for the prevention of negative environmental effects of the projects implemented under the umbrella of these decisions and programs.

4.2.1 Regional Adaptation Plans Strategic Environmental Assessments: principles and methodology

Strategic Environmental Assessments (SEA) can be carried out “ex-ante”, during the implementation of a specific program (intermediary assessment) or following it (“ex-post” assessment). An “ex-ante” assessment is performed during the preparation of the action plans and before their adoption. According to the SEA Directive, this includes a) the drawing up of an environmental report in which the likely

[9] Council Directive of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, 85/337/EEC. Official Journal No. L 175 , 05/07/1985 P. 0040 – 0048. Council Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. Official Journal No. L 073 , 14/03/1997 P. 000

[10] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. Official Journal No. L 197, 21.7.2001, p. 30–37.

significant effects on the environment and the reasonable alternatives are identified and b) the carrying out of consultations (with the public, the environmental authorities, other stakeholders and with other countries in the case of trans-boundary impacts). The specific principles which are required in order to ensure a viable and reliable SEA are the following:

- strong will of the decision-makers,
- sound and reliable framework of development (basis for EIA's of projects),
- specific methodology and flexible tools,
- strict implementation and follow-up,
- participation of stakeholders and the wider public and
- horizontal integration of environmental concerns in policies on economy/society.

4.2.2 Conducting a SEA

As a general rule, the process of conducting a Strategic Environmental Assessment (SEA) takes in the following stages:

Stage 1 – Screening

Screening is used to establish whether the programme should or should not be subject to a SEA. Regional Climate Change adaptation strategies should be subject to a SEA.

Stage 2 – Scoping

Scoping establishes the scope of the SEA. This is particularly important in climate change adaptation strategies as cross sectoral will be called for.

Stage 3 – Assessment

This describes the current state of the environment and the potential environmental impacts of the climate change adaptation strategy. The fact that such strategies are based on projections of changing environmental quality over a long time span makes the establishment of a baseline more problematic, particularly as many of the provisions of a strategy will seek to offset future environmental impacts rather than contend with current environmental impacts – the focus of the SEA. The publication of a draft version of the Environmental Report is the main output from this stage.

Stage 4 – Review

In consultation with relevant public body actors that will be affected by the climate change adaptation strategy along with private companies and individuals. This should be used to produce a finalised environmental report.

Stage 5 – Decision Making

The SEA report should be submitted to the decision makers along with the draft climate change adaptation strategy. This ensures that the SEA informs the decision making process. Decisions made concerning the climate change adaptation strategy should explicitly refer to the SEA to confirm that environmental concerns have not been overlooked.

Stage 6 – Implementation and monitoring

This is implemented to ensure that the climate change adaptation strategy does not create new or aggravate existing environmental problems. More specifically, monitoring to inform the process of adaptation to climate change can focus on two primary aspects:

- Monitoring the physical changes within the respective sectors, including environmental changes, weather changes, sea and water level changes, impacts on infrastructure and social impacts including health provision and safety.
- Monitoring of the administrative processes involved in adapting to climate change, including ensuring that the potential impacts of climate change are being integrated into local, regional and national decision making. This can also include, for example, the monitoring of public acceptance of the need to adapt to climate change, or the level of knowledge about climate impacts within society, including businesses, civil society and administration.

Stage 7 – The SEA Environmental Report

The core of the SEA process is an environmental report. When implemented as part of the process of developing and implementing a climate change adaptation strategy, this report examines the potential significant environmental effects of the climate change adaptation strategy.In conclusion, the SEA for a regional adaptation strategy needs to include analyses of the objectives and measures but also of the strengths, weaknesses and potentialities of a region and the sectors the strategy covers. It also has to make sure that the policies and measures are coherent and in line with the overall strategy and that the projects to be implemented will integrate them. Last but not least, the SEA should analyse the environmental impacts in relation with the social and economic impacts on the region and taking into account the public consultations, for more effective and long-lasting results.

4.3 North, Central and South Europe regional CC adaptation strategies

4.3.1 North Europe

The countries in the Northern region of Europe, and particularly those countries investigated under this project(Lithuania, Latvia, Estonia, Finland, Sweden, Denmark),share many of the same climatic change scenarios when viewed at a macro level. However, these common changes for instance in weather patterns elicit a variety of localised impacts. These impacts are differentiated by the location and existing geographical features of each country, but also by the local infrastructure, institutions and culture, as well as existing capacity and available financial resources. As such, there is no one-size-fits-all solution to

climate change adaptation. Climate adaptation strategies should then take the form of a framework for action, into which specific measures can later be added once the local circumstances and impacts have been assessed. Given the geographical and climate commonalities, however, it seems reasonable that a strategy for adaptation to climate change in North Europe maintains focus on those impacts and impact areas that are expected to dominate in North Europe: increased winter precipitation, warmer average annual temperatures, increased incidence of storms and longer summer dry spells.

4.3.1.1 Strategic adaptation objectives

The main strategic objective as regards climate change adaptation in North Europe is to address and mitigate the dominating CC impacts in North Europe, where possible in a cost effective and timely manner. The impacts of climate change are anticipated to take place gradually over a relatively long time period (when compared to administrative decision making cycles) but the lifecycle of many planning measures, particularly those that involve infrastructure planning, is also counted in decades. As such, the impacts of climate change should be integrated into decision making processes in these sectors now.

Integrating the impacts of climate change into decision making requires a solid and reliable information base. While national monitoring and research programmes usually provide solid overarching information about physical climate change, monitoring at a local level will facilitate more nuanced decisions based on specific local conditions. It is therefore important that local monitoring is in place to provide such information. It is also valuable to look beyond national monitoring and research programmes toward those of neighbouring countries. The North Europe report has found a significant information imbalance between the three Scandinavian countries and the three Baltic countries. Much of the lack of concern for the impacts of climate change in the Baltic States could stem from a lack of knowledge of those impacts particularly at the administrative level (notwithstanding the absence of administrative capacity and financial capital to invest in adaptation processes).

Synergies are manifold between the Northern countries. Regular knowledge exchange would benefit all countries in the region, and allow the Baltic States – which are to date lacking behind the three Scandinavian countries in respect to climate adaptation – to quickly catch up. Increased information and knowledge would allow for better risk assessment in the Baltic States and sharpen the awareness for the necessity to adapt to climate change in Estonia, Latvia and Lithuania. So far – even though impacts of climate change seem to be similar in all of the countries – the three Baltic States do not seem to realize the same necessity to adapt to these risks as the three Scandinavian countries do.

The priorities for climate adaptation across Denmark, Estonia, Finland, Latvia, Lithuania and Sweden are similar. Greatest consistence seems to exist on issues regarding the Baltic Sea. This is both logic and very valuable, as it will increase the likelihood of coordinated action. So far, despite the recognized great necessity to act, climate adaptation measures in respect to the Baltic Sea seem to be lagging behind. At the same time cooperation on other issues regarding the Baltic Sea have been manifold (e.g. the Helsinki Commission), thus the institutional framework for quick action is given.

Least action seems to be necessary in agriculture and forestry. All gathered information points to the fact that these sectors will gain more from climate change than they lose. In respect to biodiversity and the Baltic Sea on the other hand rapid and determined action will decide upon success or failure. There seems to be awareness for the necessity to act on these two areas, but concrete action has been scarce.

Finally, more work appears to be necessary in terms of societal awareness building and to reach a political consensus. For climate adaptation all parts of society (politics, business and civil society) will have to act. It has to be stated that none of the examined countries seems to have reached a point where all stakeholder groups work together to adequately and timely adapt to climate change.

4.3.1.2 Overview of measures to overcome important vulnerability limitations

The following are ***measures*** that could be useful in adapting to climate change and the anticipated impact in North Europe:

<u>Health and Social</u>

- Adjust capacity of health care system (Stakeholder Involvement: National and regional authorities, emergency medical services)
- Focus on disadvantaged groups (Stakeholder Involvement: National regional and local authorities, NGOs)

<u>Agriculture and forests</u>

- Change forest management Forestry authorities, private land owners
- Move cables for telecommunication and electricity underground (Stakeholder Involvement for both: National authorities, private electricity companies)

<u>Biodiversity, ecosystems and water</u>

- Control of invasive species (Stakeholder Involvement: National EPA, agricultural research bodies, Facilitate emigration of native species National EPA, counties, municipalities, NGOs)
- Reduce pressure on endangered ecosystems (Stakeholder Involvement: National authorities, counties, municipalities, NGOs, industry, civil society)

<u>Coastal and maritime areas</u>

- Prevent eutrophication and acidification (Stakeholder Involvement: National authorities, Local Authorities, Industry, agriculture)
- Prevent overfishing (Stakeholder Involvement: International bodies, national authorities, industry)
- Restore habitats (Stakeholder Involvement: National EPA, Local authorities, NGOs, land owners)
- Preventive construction(Stakeholder Involvement: National authorities, Local Authorities, utility companies)

Production systems and physical infrastructure

Urban flooding measures

- Increase capacity of waste water system (Stakeholder Involvement: municipalities)
- Increase natural drainage / permeable ground (Stakeholder Involvement: municipalities, national planning bodies)
- Strengthening upstream defences (Stakeholder Involvement: Local authorities, National EPA)
- Information / warning / monitoring system (Stakeholder Involvement: national authorities, local authorities)
- Drinking water protection(Stakeholder Involvement: municipalities)

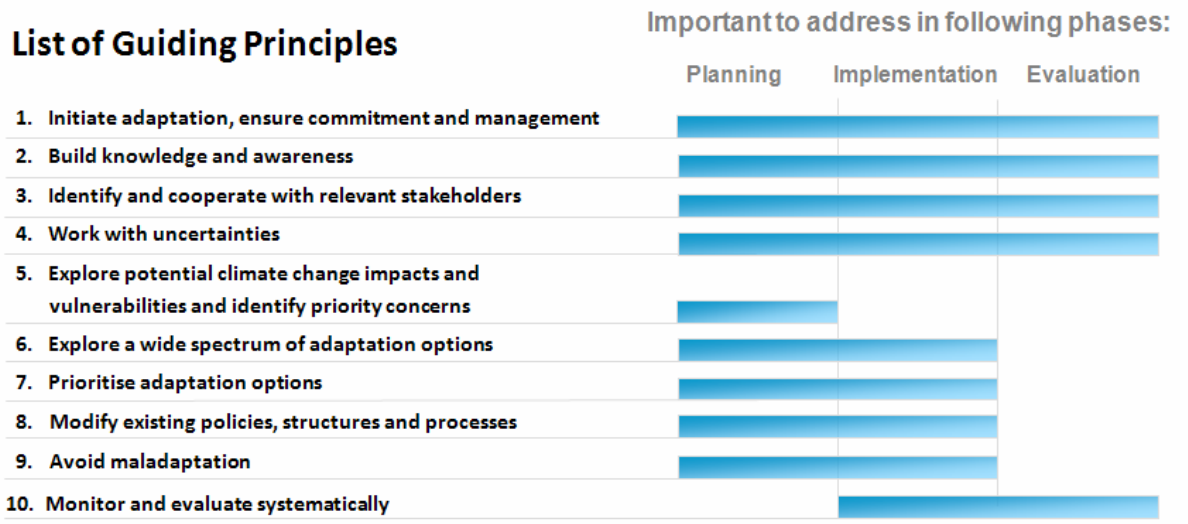
Infrastructure

Damage Prevention and Repair

- Relocation of populations and industry (Stakeholder Involvement: National planning authorities, counties, municipalities)
- Maintenance of Transport infrastructure (Stakeholder Involvement: industries, national road authorities, local authorities)
- Insurance (Stakeholder Involvement: National authorities, insurance industry)

4.3.2 Central Europe

The list below, consists of the guiding principles for adaptation to climate change and represent the product of the collective efforts put together by specialists in ETC/ATC from different European countries. They are highly relevant and applicable for the preparation of the Adaptation Strategies in Central Europe countries.



4.3.2.1 Priorities

The priorities that should receive the highest level of attention (based on the Regioclima Project's Survey with questionnaires) can be summarised as follows:

Austria:	Flooding (4D)
	Winter tourism (4D)
Bulgaria:	Flooding and Water management (4E)
	Drought (3D)
	Coastal erosion, flooding and damages (3D)
	Increased energy demand (3D)
	Insufficient transport infrastructure (3D)
	Increasing expenses for social policies (3D)
Czech Republic:	Flooding and Water management (4E)
	Increased energy demand (3D)
	Increase of climate related diseases (3D)
France:	Urban heat islands (4E)
	Sea level rise (4E)
	Increase of climate related diseases (4E)
	Increased energy consumption for air conditioning (4E)
	Biodiversity – loss of species (4E)
	Summer tourism (4D)
	Deforestation (3E)
Hungary:	Flooding and Water management (4E)
	Deterioration of ground water reserves (4E)
	Summer tourism (4E)
Italy:	Extreme change in storm frequency and strength (3D)
	Increased energy demand (3D)
	Intensive land use (3D)
	Flooding (3C)
Romania:	Flooding (4E)
	Drought (4E)
	Water scarcity (3D)
	Coastal erosion, flooding and damages (3D)
	Insufficient transport infrastructure (3D)
	Tourism (3D)
Slovakia:	Flooding (3D)
	Need for supplementary energy import inducing other risks (3D)

		POSSIBILITY OF IMPACT				
		0. Very low	1. Low	2. Medium	3. High	4. Very high
LEVEL OF IMPACT	A. Insignificant	A0	A1	A2	A3	A4
	B. Low	B0	B1	B2	B3	B4
	C. Important	C0	C1	C2	C3	C4
	D. Serious	D0	D1	D2	D3	D4
	E. Disastrous	E0	E1	E2	E3	E4

This coloured assessment matrix allows the combination of the two criteria: "possibility of impact" and "level of impact" { the level of an impact to the environment and to the current social and economic situation of each region participating to the project has been firstly assessed by the partners, who responded to questionnaires, in a scale from A (insignificant level) to E (disastrous level) }

4.3.2.2 Adaptation measures

The following is a short overview of possible actions that can be taken in Central Europe countries:

Priority area: flooding

-Better map vulnerability for flood risk and regulate vulnerable land

-Invest in improved weather forecast, better warning systems and more efficient evacuations, Inform people better about the flood risks(Stakeholders Involved for both measures: State bodies, regional authorities, municipalities, research institutes)

-Better enforce existing building codes and improve them so that new structures would be better able to withstand extreme weather events

-Use floodplains instead of levees acting as buffers for remaining areas (Stakeholders Involved for both: State bodies, regional authorities, municipalities)

Priority area: Coastal erosion and coastal damages

-Develop county-scale maps

-Invest in improved weather forecast, early warning systems and flood hazard mapping for storms

-Reduce environmental degradation where loss of vegetation destabilizes shore, leading to dangerous landslides (Stakeholders Involved for latter three: State bodies, regional authorities, municipalities, research institutes)

-Protect wetlands and beaches that act as natural seawalls against extreme weather events (Stakeholders Involved: State bodies, regional authorities, municipalities)

-Protecting water supplies from contamination by saltwater (Stakeholders Involved: State bodies, regional authorities, municipalities, water companies)

Priority area: Tourism

-Enhanced design, siting standards and planning guidelines for coastal tourism establishments (Stakeholders Involved: State bodies, regional authorities, municipalities, tourism entrepreneurs)

-Improved education/awareness raising among tourism businesses and their staff, as well as tourists (Stakeholders Involved: State bodies, regional authorities, municipalities)

-Technical measures in the winter tourism resorts (Stakeholders Involved: State bodies, regional authorities, municipalities, tourism entrepreneurs)

-Behavioural measures (transition towards non-snow dependent activities) in the winter tourism resorts (Stakeholders Involved: State bodies, regional authorities, municipalities, tourism entrepreneurs)

Priority area: Human health

-Reduction of urban heat islands by planting trees and providing vegetation and water in urban environment (Stakeholders involved: State bodies, regional authorities, municipalities)-Invest in improved surveillance and warning systems for heat stress, aeroallergens and for the prevalence of allergic diseases, particularly asthma (Stakeholders Involved: State bodies, regional authorities, municipalities, hospitals)

-Invest in improved public health systems controlling (Stakeholders Involved: State bodies, regional authorities, municipalities, hospitals)

-Improved education/awareness rising among population (Stakeholders Involved: State bodies, regional authorities, municipalities)

Priority area: Energy

-Increasing energy efficiency to offset increases in energy consumption due to warming (Stakeholders Involved: State bodies, regional authorities, municipalities, businesses, public)

-Protecting facilities against extreme weather events and/or relocation of the infrastructure to more secure locations (Stakeholders Involved: State bodies, regional authorities, municipalities, businesses)

- Development of the strategies to address changing demand patterns (Stakeholders Involvement: State bodies, regional authorities, municipalities, electricity companies)

- Understanding infrastructure vulnerability and implement infrastructure reinforcement measures (Stakeholders Involved: State bodies, regional authorities, municipalities, electricity companies)

- Diversifying power supply in the event of power plant failures due to excess demand created by extreme heat, or by extreme weather events (Stakeholders Involved: State bodies, regional authorities, municipalities, electricity companies)

4.3.3 South Europe

Water scarcity and management of water resources is a primary concern for all South Europe partners, with issues of energy production and energy infrastructure coming second but at more or less the same level of importance. This applies to agriculture as well, as all regions-partners face the deterioration of cultivable land and the loss of competitiveness for their products in the European and international

market, but they are not all in the same level (the Cretan and the Venetian agricultural products appear to be less affected in terms of competitiveness).

Forest fires of course are a common concern for all South Europe partners and this, for instance, could be another opportunity for cooperation and knowledge exchange on how to adapt to changes in climate so as to prevent them from causing fires.

Pollution is another representative example of the situation: Greece rates air/soil/maritime pollution as important with medium possibility to occur, whereas for Cyprus air pollution is a low level impact without much possibility to occur; for Spain, soil pollution is far more probable to occur than air pollution, whereas for France the opposite is stated.

In addition, the analysis that has preceded this section has shown that each region-partner perceives their priority axes in different ways based mostly on needs and deficiencies rather than actual priorities which will contribute to the development and implementation of adaptation strategies. This could perhaps explain why most of the currently adopted measures present a fragmentary character and it also fortifies the need to develop a global and cohesive strategy.

4.3.3.1 The 3 Groups

An overview of the ***following two tables*** leads to the conclusion that the seven discussed regions: Greece, Cyprus, Italy, Spain, France, Portugal, Malta can be categorized in three groups, which may not be completely distinct, they are however useful as a means of analysis of the present situation and as a tool for the proposition of new adaptation strategies and policies: a) Cyprus – Greece – Malta, b) Spain – Italy and c) France – Portugal. The regions of each group have similar geographical and economical characteristics and they also share common problems and priorities in terms of climate change impact.

For example, the regions from Cyprus, Greece and Malta need to tackle more the impacts of the policies on water resources, tourism and infrastructure, whereas the regions from Spain and Italy can focus more coastal impacts and France-Portugal more on forests, biodiversity and health impacts.

Table 5. Characteristics of the regions surveyed

	Coastal	Island	Mountainous	Urban	Agriculture	Tourism	Commerce	Industry	Fisheries
Cyprus –Larnaca District	X	X	X	X	X	X	X		X (little)
Greece – Region of Crete	X	X	X	X	X	X	X		X (little)
Spain – Region of Valencia	X		X (west)	X		X	X	X	
Italy – Region of Venice	X			X		X	X		
France – Pays d'Aubagne et de l'Etoile	X		X (hills)	X	X	X	X	X	
Malta	X	X	X (hills)			X	X		
Portugal	X		X	X	X (little)	X	X	X	X (little)

Table 6. Aspects and impacts identified by the regions surveyed

Region \ Aspect	Health & Social Pol.	Agriculture and Forests			Biodiversity, Ecosystems and Water		Coastal and Maritime Areas		Production systems and Infrastructure	
	Health	Drought	Forest fire	Agric.	Biodiv. / Ecos.	Water Mgt	Coasts	Fisheries	Energy	Tourism
Cyprus –Larnaca District	D3	E4	E4	D3	D3	E4	D3	E4	D3	E4
Greece – Region of Crete	D3	D3	D3	C2	C2	D3	D3	C2	E4	D3
Spain – Region of Valencia	D2	E4	D3	E3	D3	E4	E4	D3	E3	D2
Italy – Region of Venice	C2	C2	C2	D3	D2	D3	E4	C2	C4	C2
France – Pays d'Aubagne et de l'Etoile	E4	E2	E4	E3	E4	D2	E2	C2	E4	D4
Malta	X	X		X	X	X	X		X	X
Portugal	X	X	X	X	X	X			X	X

Note: *a) Red = critical point of attention (i.e. where it makes sense to prioritize the development of the adaptive capacity) b) Pink = significant risk point of attention c) parentheses around a country name in the Red area, denote that the specific point is Pink for that country / region*

More particularly, the members of the first group share important concerns and high priorities in sectors such as water management and drought, energy production shortage and infrastructure failure and significant tourism impacts. The second group of regions is mostly occupied with issues such as agricultural production and competitiveness, coastal impacts, water shortage and floods. The third group has prioritized the impacts in the sectors of forests, tourism, health impacts, forests/biodiversity and agriculture.

Regardless the above categorization though, most of these south European regions have identified certain aspects and specific impacts as more or less important and in need of attention. These include agriculture, water management (and drought or floods), health impacts, coasts and energy sufficiency.

In terms of capacity to adapt to climate change, almost all partners of South Europe attribute great importance to factors such as the ability to process information and the willingness of all stakeholders to cooperate and find common grounds. Building the adaptive capacity of each region is crucial for the development and successful implementation of adaptation measures.

There is no doubt that there are differences in adaptive capacities: regions like Greece (Crete), Malta and Portugal seem to need more flexibility and focus on adopting and implementing a cohesive strategy of adaptation rather than measures in different sectors that often contradict each other and may bring undesirable results. Although in Crete, up to now, the capacity of the region to adapt to climate change

depends a lot on the actions of the central administration, a shift has just begun with the newly appointed regional authorities which have more powers than their predecessors.

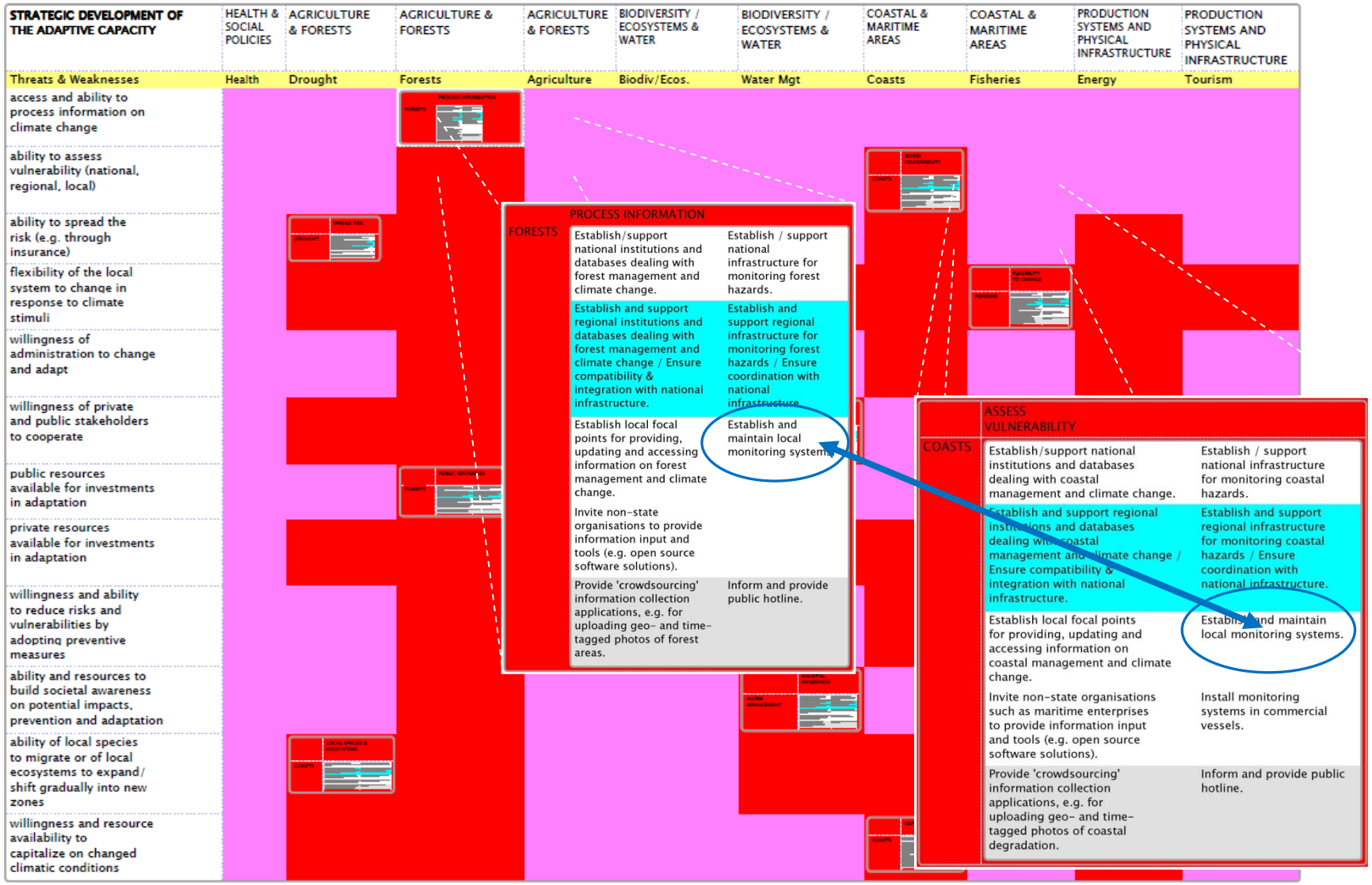
On the other hand, France, Cyprus and maybe Spain are already in the process of adopting a global approach of the adaptation to climate change impacts, though this takes place in national level. In France and in Italy, the region has a certain degree of autonomy and can adopt their own action plans; however we need to stress again the importance, for these regions, of collaboration and exchange of successful policies and best practices.

In times of economic and financial instability, like today, the implementation of adaptation measures may appear strange or even very difficult. Implications could arise from many sources, such as the lack of flexibility of public administrations, the lack of willingness for public and private sector to cooperate and build consortia, the inefficiency of awareness-raising campaigns or even the very impacts of climate change getting worse and worse.

As tourism, agriculture, human health and everyday life are intensely and constantly affected by the impacts of climate change, the regions of South Europe need to recognise that overcoming any implications and adapting to this change is certainly for their medium- and long-term benefit. After all, already most of the existing regional or national adaptation strategies or plans not only mention but take for granted the fact that if countries do not act immediately and pay the cost now, the price that will be paid later will be significantly higher.

4.3.3.2 Proposed measures

The following diagram shows a way to 'map' the various matrices of measures proposed, to the specific critical points covered, as well as an example identification of measures that can be consolidated.


STRATEGIC DEVELOPMENT OF THE ADAPTIVE CAPACITY
HEALTH & SOCIAL POLICIES
AGRICULTURE & FORESTS
AGRICULTURE & FORESTS
AGRICULTURE & FORESTS
BIODIVERSITY / ECOSYSTEMS & WATER
BIODIVERSITY / ECOSYSTEMS & WATER
COASTAL & MARITIME AREAS
COASTAL & MARITIME AREAS
PRODUCTION SYSTEMS AND PHYSICAL INFRASTRUCTURE
PRODUCTION SYSTEMS AND PHYSICAL INFRASTRUCTURE
Threats & Weaknesses
Health
Drought
Forests
Agriculture
Biodiv/Ecos.
Water Mgt
Coasts
Fisheries
Energy
Tourism
access and ability to process information on climate change
ability to assess vulnerability (national, regional, local)
ability to spread the risk (e.g. through insurance)
flexibility of the local system to change in response to climate stimuli
willingness of administration to change and adapt
willingness of private and public stakeholders to cooperate
public resources available for investments in adaptation
private resources available for investments in adaptation
willingness and ability to reduce risks and vulnerabilities by adopting preventive measures
ability and resources to build societal awareness on potential impacts, prevention and adaptation
ability of local species to migrate or of local ecosystems to expand/ shift gradually into new zones
willingness and resource availability to capitalize on changed climatic conditions
PROCESS INFORMATION
FORESTS
Establish/support national institutions and databases dealing with forest management and climate change.
Establish / support national infrastructure for monitoring forest hazards.
Establish and support regional institutions and databases dealing with forest management and climate change / Ensure compatibility & integration with national infrastructure.
Establish and support regional infrastructure for monitoring forest hazards / Ensure coordination with national infrastructure.
Establish local focal points for providing, updating and accessing information on forest management and climate change.
Establish and maintain local monitoring systems.
Invite non-state organisations to provide information input and tools (e.g. open source software solutions).
Provide 'crowdsourcing' information collection applications, e.g. for uploading geo- and time-tagged photos of forest areas.
Inform and provide public hotline.
ASSESS VULNERABILITY
COASTS
Establish/support national institutions and databases dealing with coastal management and climate change.
Establish / support national infrastructure for monitoring coastal hazards.
Establish and support regional institutions and databases dealing with coastal management and climate change / Ensure compatibility & integration with national infrastructure.
Establish and support regional infrastructure for monitoring coastal hazards / Ensure coordination with national infrastructure.
Establish local focal points for providing, updating and accessing information on coastal management and climate change.
Establish and maintain local monitoring systems.
Invite non-state organisations such as maritime enterprises to provide information input and tools (e.g. open source software solutions).
Install monitoring systems in commercial vessels.
Provide 'crowdsourcing' information collection applications, e.g. for uploading geo- and time-tagged photos of coastal degradation.
Inform and provide public hotline.

5. Recommendations

5.1 What can LRAs do to adapt to Climate Change

While mitigation tackles the causes of climate change, adaptation tackles the effects of the phenomenon. Climate mitigation and adaptation should not be seen as alternatives to each other, as they are not discrete activities, but rather a combined set of actions in an overall strategy. In this context, the following actions and measures are indicated:

5.1.1 Activity timeframes

As climate change is rapidly going on, it became obvious that public authorities have to accelerate their decision-making and preparatory work. Therefore they should adjust their structures, procedures and mechanisms accordingly. More specifically, they should aim at the development of adaptive capacity at two activity timeframes, i.e. normal operation and unplanned events, providing for:

- Continuous availability of resources to cope with regular requirements (e.g. increased medical capacity to provide treatment for disease rates augmented as a result of climate change).
- Reserve capacity to support operations in emergency situations. This might mean, for example, the ability to mobilize medical resources from neighbouring regions to rapidly confine the outbreak of a contagious epidemic.
- A potential for increased adaptive capacity of other key actors as well, including central government, local administration, non-state organisations such as private business and NGOs as well as the general public.
- Mobilization of other actors (this can be achieved by utilizing the methods depicted in the relevant table in section 4.1).
- Energy security at the level of CC adaptation can be improved through decentralisation of electric power generation.

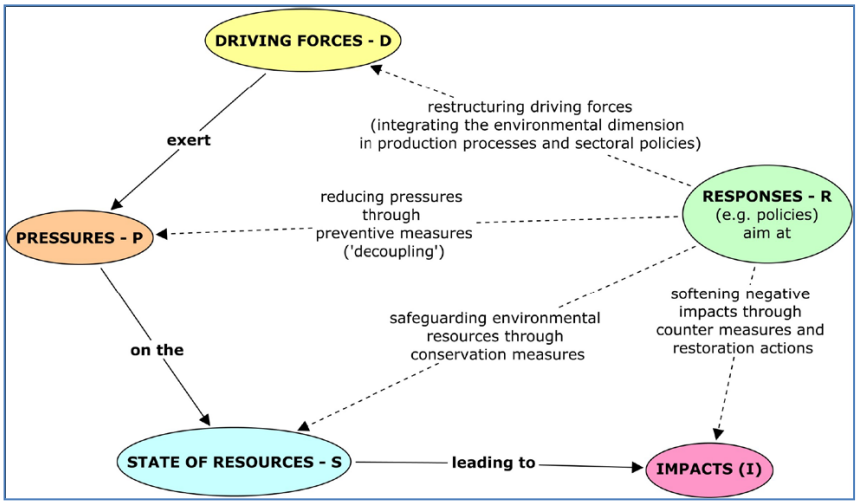
5.1.2 Multitude of measures

It is considered essential that the measures proposed to address CC adaptation needs are appropriately prioritised; however such a prioritisation of measures should not result in the loss of the overall perspective of what is envisaged to be achieved. This can be achieved as follows:

- Only one measure per actor/stakeholder should be proposed per timeframe, for every critical combination of impact threat and adaptive capacity weakness.
- All measures per actor/stakeholder should be aggregated.
- Consolidated approaches should be figured out, where a certain measure can provide the actor/stakeholder's contribution for several critical points.

- The critical points that are not covered by the proposed consolidated measures have to be identified; for these cases, the originally proposed measure should be maintained.

- For measures to be implemented by the Regions themselves, synergies that can be achieved with other actors / stakeholders should be identified, especially where the above consolidated measures do not apply.



The aforementioned climate mitigation and adjustment policies should aim at:

- Safeguarding environmental resources through conservation measures

- Softening negative impacts through counter measures and restoration actions

- Reducing pressures (on resources) through preventive measures

- Integrating the environmental dimension in production processes and sectorial policies

5.1.3 Synergies

Synergies are manifold between countries in a geographical region. Regular knowledge exchange would benefit all countries in it, and allow the ones which are to date lacking behind the others in respect to climate adaptation, to quickly catch up. Increased information and knowledge would allow for better risk assessment on the one hand and on the other sharpen awareness on the necessity to adapt to climate change. To this end the following activities should be promoted:

- Specific workshops on climate change adaptation with participants from all countries of a region could be organised. The workshops may simply focus on information exchange or encourage deeper investigation of specific CCA measures.

This interaction among stakeholders could promote cooperation and facilitate decision making at a regional level.

- A more lasting way to maintain interest and focus on regional cooperation is to exploit existing tools, such as web platforms. These tools could function as ad hoc information exchange facilitators. Best practise examples or innovative measures can be proposed.

In general, both workshops and web-tools help stakeholders involved to highlight potential regional similarities and differences, identify appropriate measures and cooperate with their neighbours towards a comprehensive regional approach that makes best use of synergies among authorities involved in CCA action.

5.1.4 Monitoring systems

Local and regional authorities should adapt their current monitoring systems within all 5 sectors (health and social policies, agriculture and forests, biodiversity/ecosystems/water, coastal/marine areas and production systems and physical infrastructure) to include aspects of potential impacts from climate change (in particular priority impacts). Such monitoring will provide valuable information about the success of adaptation measures and the necessity of future measures. In addition, provisions should be made to monitor the integration of climate change adaptation into the decision process at local level.

5.1.5 Guiding principles

Guiding principles for adaptation to Climate Changes can be formulated as follows:

- Knowledge transfer and provision of information to the public, decision makers, stakeholders and all the parties involved at both policy and implementation levels. The information provided has to be reliable and relevant to climate change impacts. Therefore, it is important to create an overall information and awareness strategy. Awareness campaigns should address topics such as, adaptation measures, tools, best practices and policies.

- Identify and cooperate with relevant stakeholders: Since adaptation often spans several sectors of activities and across different levels of government, it is important to create an environment of mutual understanding, cooperation and interaction among a wide spectrum of stakeholders. Only then conflicts can be avoided, synergies ensured and successful collaboration built between various actors in the implementation of adaptation activities.

- Work with uncertainties in order to anticipate potential hazardous events well in advance. Climate change and its impacts bring a whole spectrum of uncertainties. It is, for example, very difficult to define what will be the amounts of greenhouse emissions at a certain point of time. Long-term data at a regional level may be insufficient, while scientific knowledge on climate has still not dealt with all doubts and questions. Therefore, it is useful to work with possible climate impact scenarios in order to create plausible outcomes in the future; however it should be noted that

relevant scenarios, although based on measured data and scientific knowledge, cannot yet predict the actual future impacts of climate change in a completely clear way.

- Explore potential climate change impacts and vulnerabilities and identify priority concerns. It is necessary to gain a better understanding of how and in what way climate change will affect the services, social groups, economic sectors and assets in a given region from a short- and long-term perspective.

- Explore a wide spectrum of adaptation options. Depending on the particular aspects of given climate change impacts, it is necessary to explore various adaptation options in the areas of technology, infrastructure, organization, ecosystems, socio-economic groups as well as behaviour.

- Prioritise and assess adaptation options by defining specific criteria, such as importance, effectiveness, urgency, sustainability, co-benefits and side-effects, reversibility, flexibility, and resilience.

- Avoid maladaptation: It is almost as bad as implementing no adaptation processes when maladaptive actions are undertaken. They may not only fail to reduce climate change impacts, but could even exacerbate their effect in the long term.

- Prior to initiating adaptation action, ensure commitment and effective management. An approach open to stakeholders, based on a realistic understanding of available resources and appropriately coordinated is more likely to be successful.

- Adopt a gradual approach to adaptation; start by modifying existing policies, structures and processes.

- Develop and apply monitoring procedures. Adaptation is not a one-off procedure, hence a reliable feedback system is considered essential to facilitate effective decision making.

5.1.6 Priority Actions for LRA Climate Change adaptation (Examples)

EXAMPLE 1. Improving **access and ability to process information** on climate change, within the context of **Forests**

ACTIVITY ADMINISTRATION	CONTINUOUS / REGULAR	RESERVE / EMERGENCY
CENTRAL GOVERNMENT	1. Establish/support national institutions and databases dealing with forest management and climate change.	2. Establish / support national infrastructure for monitoring forest hazards.
REGION	3. Establish and support regional institutions and databases dealing with forest management and climate change / Ensure compatibility & integration with national infrastructure.	4. Establish and support regional infrastructure for monitoring forest hazards / Ensure coordination with national infrastructure.
LOCAL ADMINISTRATION	5. Establish local focal points for providing, updating and accessing information on forest management and climate change.	6. Establish and maintain local monitoring systems.
NON-STATE ORGANISATIONS (Private Business and Social Enterprises / NGOs)	7. Invite non-state organisations to provide information input and tools (e.g. open source software solutions).	8. -
GENERAL PUBLIC	9. Provide 'crowd sourcing' information collection applications, e.g. for uploading geo- and time- tagged photos of forest areas.	10. Inform and provide public hotline.

EXAMPLE 2. Improving the **ability to spread the risk (e.g. through insurance)** in the context of **Drought**

ACTIVITY ADMINISTRATION	CONTINUOUS / REGULAR	RESERVE / EMERGENCY
CENTRAL GOVERNMENT	1. Establish and support a special fund for drought reparation, including relocation of affected activities and populations.	2. -
REGION	3. Provide infrastructure for relocation and distribution of activities and housing in areas of less risk / Maintain secondary road infrastructure to prevent potential isolation.	4. -
LOCAL ADMINISTRATION	5. Promote 'twinning' or a 'buddy system' among towns and cities to facilitate relocation in case of emergency.	6. -
NON-STATE ORGANISATIONS (Private Business and Social Enterprises / NGOs)	7. Provide incentives for relocation and distribution of activities in areas of less risk.	8. -
GENERAL PUBLIC	9. Provide information for availability and pricing of housing in areas of less risk.	10. -

EXAMPLE 3. Increasing the **flexibility of the local system to change** in response to climate stimuli, regarding **Fisheries**

ACTIVITY ADMINISTRATION	CONTINUOUS / REGULAR	RESERVE / EMERGENCY
CENTRAL GOVERNMENT	1. Research economic and nutritional aspects of fisheries in national economy and assess alternative options	2. -
REGION	3. Research economic aspects of fisheries in regional economy and assess alternative options / Encourage regional job creation in proposed alternative fields	4. -
LOCAL ADMINISTRATION	5. Encourage local job creation in proposed alternative fields	6. -
NON-STATE ORGANISATIONS (Private Business and Social Enterprises / NGOs)	7. Provide incentives for the establishment of commercial aquaculture installations, partly to repopulate marine life / Provide skill training to fishing professionals interested in career change	8. -
GENERAL PUBLIC	9. Inform about changing job market conditions / Inform about consumer alternatives to scarce fish products	10. -

EXAMPLE 4. Increasing the **willingness of administration to change and adapt** in the context of **Biodiversity** preservation

ACTIVITY ADMINISTRATION	CONTINUOUS / REGULAR	RESERVE / EMERGENCY
CENTRAL GOVERNMENT	1. Estimate the value of basic ecosystem services to the national economy.	2. -
REGION	3. Estimate the value of basic ecosystem services to the regional economy / Set regional biodiversity indicators and targets / Establish a regional biodiversity protection council and publicise its activities.	4. -
LOCAL ADMINISTRATION	5. Highlight the value of basic ecosystem services to the local economy / Set local biodiversity indicators and targets / Establish local biodiversity protection councils and publicise its activities.	6. -
NON-STATE ORGANISATIONS (Private Business and Social Enterprises / NGOs)	7. Collaborate with NGOs protecting biodiversity to highlight the economic value of its services / Promote participation in biodiversity protection councils.	8. -
GENERAL PUBLIC	9. Promote voluntary participation in biodiversity protection councils' activities, as well as their public accountability.	10. -

EXAMPLE 5. Increase the **willingness of private and public stakeholders to cooperate** in **Water management**

ACTIVITY ADMINISTRATION	CONTINUOUS / REGULAR	RESERVE / EMERGENCY
CENTRAL GOVERNMENT	1. Update national water management strategies (under the provisions of the Water Framework Directive) and legal - institutional framework, through public consultation	2. Support links between regional water supply networks / Establish national emergency water management plans.
REGION	3. Update water management plans under WFD, through public consultation	4. Maintain regional emergency water reserves / Establish emergency water resources, e.g. through desalination / Establish regional emergency water management plans.
LOCAL ADMINISTRATION	5. Implement water saving measures and water reuse / Implement water pricing schemes encouraging efficient use of water resources	6. Maintain local emergency water reserves / Establish emergency water resources, e.g. through desalination
NON-STATE ORGANISATIONS (Private Business and Social Enterprises / NGOs)	7. Promote best business practices in water management / Collaborate with farming unions and enterprises to implement water management schemes / Promote non-intensive agricultural practices	8. Include in preparation of emergency water management plans
GENERAL PUBLIC	9. Promote daily best practices in water use	10. Provide guidance for water management in case of emergencies

EXAMPLE 6. Increase **public resources available for investments in adaptation** in the context of **Forests**

ACTIVITY ADMINISTRATION	CONTINUOUS / REGULAR	RESERVE / EMERGENCY
CENTRAL GOVERNMENT	1. Establish forest fund financed by carbon emissions permits / Establish preventive measures for forest protection within the context of health and quality of life	2. Implement 'unidefence' paradigm, coordinating armed forces / police and fire service at the national level.
REGION	3. Establish regional forest funds financed by real estate related income	4. Implement 'unidefence' paradigm, coordinating armed forces / police and fire service at the regional level.
LOCAL ADMINISTRATION	5. Establish local forest funds financed by ecotourism activities	6. Train personnel in fire fighting / Support volunteer fire fighting teams
NON-STATE ORGANISATIONS (Private Business and Social Enterprises / NGOs)	7. Establish forest watch volunteer teams	8. Establish volunteer fire fighting teams
GENERAL PUBLIC	9. Promote forest watch volunteering	10. Train volunteer fire fighters

5.2 LRA networks and strategic alliances, synergies & threats

It is rapidly becoming clearer that Climate Change is one of the greatest challenges for future generations. It will have impacts on all other areas of life, from food and water resources, to rising sea levels and the economy[11]. Climate change is an on-going phenomenon; due to the increased frequency of climate change events, its impacts on everyday life have become visible to people living in almost all areas around the globe. In the near future, climate change is expected to have a range of impacts across the EU, affecting regions and Member States in many different ways. This tendency will have major implications for the EU's regional and cohesion policy and should be dealt with as a broader EU consideration, when deciding on the provision of technical and financial assistance[12] to the most affected areas[13]. In this context, adaptation strategies should be cross-sectoral and developed within regional strategic alliances[14] and cooperation policies; elements of such an approach are outlined in the following paragraphs, highlighting Climate Change related synergies and threats, as well as key recommendations for LRAs, focusing on specific thematic sectors:

1. In the agriculture and forestry sectors, a reduction of productivity due to heat stress, soil degradation, unsustainable uses of land, irrigation problems and increase of flood risk is expected to have serious effects on the national, regional and local economies of EU MS[15]. It is to the interest of LRAs to promote interregional cooperation in the marketing of agricultural products, as well as EU level action towards the support of agricultural areas which are expected to face sustainability problems due to climate change. More specifically, LRAs could advocate for EC support to address a potential gradual reallocation of rural manpower, equipment, know-how and capital resources from areas where agricultural activities decline, towards existing or new areas and sectors of rural interest. The same is valid for the forest industry (due to the possibility of flooding, erosion and loss of forest land) as well as fishery (due to destruction of fish stocks, for instance in Cyprus). Thus a further, reasonable usage of these resources could be ensured, which would strengthen agricultural activities and structures while simultaneously decrease unemployment within the rural population.

2. A large and increasing share of agricultural economy in EU MS is based on the production and promotion of regionally or locally specific products; EU agricultural product quality policy[16] supports such initiatives through schemes such as the Traditional Speciality Guaranteed (TSG) for agricultural farm products and foodstuffs,

[11] Community Interest Company (2005)
[12] For a detailed inventory of financing instruments for LRAs, see Table 7 at the end of section 5.2
[13] EC (2010)
[14] For a list of LRA networks and alliances active in the field of Climate Change Adaptation, see Table 8 at the end of section 5.2
[15] This development was initially detected in Africa, but is becoming more and more relevant also for European Union Member States - for more see Ezeaku, P. I. and A. Davidson (2008) 'Analytical situations of land degradation and sustainable management strategies in Africa', J. Agri. oc. Sci., 4: 42–52.
[16] http://ec.europa.eu/agriculture/quality/

as well as the Protected Designation of Origin (PDO) and the Protected Geographical Indication (PGI) for agricultural farm products and foodstuffs, wines and spirits. The expected changes in local climate conditions seriously affect local ecosystems (through processes and events such as soil erosion, extreme weather, drought, soil depletion, loss of habitats, species extinction, and changes in species distribution) can put in danger these regional and local economy structures (but also create opportunities for other localities to start up new activities (e.g. wine making in northern Europe regions). LRAs should establish mechanisms promoting the exchange of experiences in specific agricultural sectors of interest, as well as seek funding for the establishment of more sustainable land use practices (promoting for instance extensive agricultural practices, see section 5.1.7, example 5).

3. Climate change, with a little help from technology advancements, has opened up completely new possibilities in plant culturing, as the following examples indicate: (i) declining summer rainfall (as already mentioned in section 2.2) is making European areas influenced by the Gulf Stream increasingly suitable for olive farming and vineyards (Sharp 2007); (ii) cultivation of pecans has become a growing business as a result of the increasingly extended and with limited rainfalls north-western European summers, and could potentially be grown in northern regions as well as the South; (iii) north-western European farmers could begin an almond harvest around October, as long as the last frost arrives no later than March; (iv) the development of frost-resistant rootstocks has made apricots a far sturdier crop, and that, coupled with the longer summer and autumn, makes apricots particularly well-suited to north-western European conditions - with the provision of adequate wind-breaks, successful crops can be expected in most regions around September. LRAs should opt to make best use of available EU funding, awareness-raising and exchange of experiences tools in order to boost these new agricultural opportunities. Moreover, interregional cooperation should be encouraged towards exploring new geographical areas and fields of application for technical and agricultural know-how developed in Southern Europe.

4. Climate Change is a serious challenge for the tourism industry. On the one hand, in Southern Europe it mainly stands as a risk, with water scarcity, droughts, deterioration of freshwater quality, soil erosion and desertification or flooding, being estimated as highly probable events with serious effects on the environment (e.g. coastlines in northern Crete are expected to significantly retreat) and subsequently on the tourism business. The size of areas prone to these risks renders small-scale, piecemeal initiatives, practically ineffective; protection of the tourism economy from climate change requires large scale land-use planning considerations, as well as the wide implementation of environmental projects in priority areas (see also section 5.1.7). LRAs should therefore advocate stronger involvement in planning processes at EU level, and make best use of available EC support (in terms of access to funding, knowledge and experience transfer tools, capacity building as regards organisational skills[17]) towards the joint design and implementation of large scale environmental projects, often involving interregional cooperation.

[17] Natalini A., Stolfi F. (2011)

5. On the other hand, in several EU areas, such as the Western and Central parts of Europe (see also section 2.2 on Coastal and Maritime Areas policies), climate change provides an opportunity for the tourism business to grow significantly, along with the expected prolongation of the tourism season. But also for southern areas, climate change can have a positive impact on tourism development; for instance, average spring and autumn temperatures will increase to a degree that would allow typical summer tourism activities (e.g. enjoying the sun and sea, going sightseeing, mountain-climbing, biking or walking) to take place from as early as March to as late as November. In this context, potential climate change benefits include taking the burden off the extremely overloaded infrastructures serving the during the summer tourist-flow (e.g. trains, ships and flights to countries in Southern Europe, motorway Munich-Salzburg-Italy at the beginning of holidays in German federal states)[18], and subsequently less stress on tourism hotspots such as the Mediterranean islands or historic city centres. LRAs should therefore advocate national and EU level action facilitating a more balanced tourism flow, with an increase in the number of tourists travelling to destinations outside the high season. In practical terms this could mean for instance rescheduling of schools' holidays (coupled with an awareness-raising campaign on new trends in holiday planning) in order to allow families to organize regular holidays also in spring and autumn.

6. Extreme climate conditions such as high temperature and water scarcity, demand solutions for the improvement of living conditions, such as more efficient air conditioning in buildings (for instance in business office complexes) or adequate water supply. As indicated in the work of REGIOCLIMA partners[19], a large number of relevant good practices have already been implemented by EU LRAs; therefore enhancement of collaboration among LRAs is considered essential towards the transfer of good practices in Climate Change Adaptation.

7. Depletion, extinction or loss of habitats and changes in species distribution is likely to occur in areas within all EU MS. As a consequence of sea level rise, extreme weather events, change in local microclimate, as well as soil degradation (due to unsustainable uses of land), natural habitats will be significantly altered and limited. To address this issue, cross-border flora and fauna management is required among other issues (see also section 4.1.3: Climate Change Adaption measures - anticipatory measure example). In this respect, joint ecosystems management approaches should be developed by neighbouring regions, giving particular attention to land-use planning considerations.

8. As regards the modifications required in national risk management due to climate change, synergies between the geographical areas in Europe can be established at national authority level and in the field of civil protection (see section 5.1.3). For

[18] Allgemeiner Deutscher Automobil-Club: Reise & Freizeit. Alpenstraßen. Source: http://www.adac.de/reise_freizeit/verkehr/alpenstrassen/default.aspx

[19] See also: Veneto region et al (2011), 'Good practice guide on climate change adaptation strategies for regional authorities and institutions', REGIOCLIMA project.

instance, an increase in forest fires in Central Europe is likely due to augmented drought phenomena, i.e. for reasons similar to those usually appearing in Southern Europe. LRAs who are most affected by forest fire incidents could advocate the development of a joint protection fleet, covering the operational needs of forest fire fighting at pan-European scale, as well as the provision of EC funds for the exchange of experiences among EU MS and the development of relevant capacities in the field of forest fire fighting. At the moment, only bilateral assistance and training actions have been undertaken (e.g. at operational level involving Greece-France, Italy-Spain).

9. Climate change impacts on urban green spaces are gradually becoming visible; when these are combined with urban heat phenomena, they put in danger the microclimate of green spaces (see section 2.2.: Biodiversity, ecosystems and water policies). Sustaining green areas has become a more and more expensive task for public authorities responsible for the management of green areas. LRAs, as competent authorities, are often called to address problems caused by inappropriate landscape design (including the selection of plant species which are not resistant to climate variations) and plant maintenance techniques[20]. LRAs would save significant resources by employing experts specialising in the design of green spaces, and by applying this expertise in the selection of new plant species (such as Ericaceae instead of lawn, which has high irrigation demands) and the implementation of landscaping works (e.g. application, in Southern Europe, of landscape techniques facilitating resistance to dry periods[21] and requiring less water consumption). Moreover, LRAs can make best use of Structural funds to re-design open spaces, in order to make them appropriate for use during extreme (for the region and the season) climatic conditions.

10. The EU White Paper on adaptation to climate change, stresses that, MS should integrate adaptation activities when preparing their programmes for Community support[22]. This is particularly relevant for infrastructure projects, transport and telecommunication systems. Major infrastructures such as bridges, ports and motorways have lifetimes of 80-100 years, so today's investments must take full account of the conditions projected for the end of the century. Buildings and other infrastructure designed to last 20-50 years will also have to withstand future climate conditions. Investments that are optimal under current conditions may not necessarily be economically viable under future climatic conditions; therefore planning of relevant infrastructure should address both current and projected climate conditions and impacts. For example, in the Netherlands, state-of-the-art knowledge on effects of climate change on river flows and sea level rise is already taken into account in infrastructure design. LRAs should advocate the provision of relevant technical expertise and financial resources within the context of the Structural funds, in order to ensure that medium and long-term investments are “climate proof”.

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[20] Bofilias, A.: Blasses Grün für bunte Spiele. Landschaftsarchitektur bei den Olympischen Projekten in Athen. In: Deutsche Gesellschaft für Gartenkunst und Landschaftskultur e. V. (Hrsg.): Garten+Landschaft. Zeitschrift für Landschaftsarchitektur. Heft 9/2004 (Interreg – grenzüberschreitend. September). Berlin-München, 2004. S. 10-11.

[21] Polunin, O.: Plants of Greece and the Balkans. A field guide. Oxford, 1987.

[22] EC (2009)

11. Population exposure to increasing incidents of air pollution and high temperatures phenomena in several urban centres in south Europe, puts pressure on the (in several cases regional) health systems of the countries involved. In southern Europe, most national health administrations, often together with LRAs, have initiated awareness and information campaigns about potential health risks due to extreme heat, targeting the local population. Given that extreme temperatures usually coincide with the high season in tourism destinations, and in view of the implications of the new Directive on patients' rights in cross-border healthcare,[23] it is strongly recommended that such campaigns be implemented not only in South Europe, but also in northern and central Europe. LRAs can assist in that respect, by mobilising their networks to promote relevant initiatives.

Table 7. Inventory of funding instruments accessible by EU LRAs, with potential use in CCA measures

Funding instrument	**INTERREG IVC**
Description	*This programme provides funding for interregional cooperation across Europe and it is financed through the European Regional Development Fund (ERDF). The programme aims to contribute to the Union's strategy for growth and jobs.*
Size & type of available funds	The Operational Programme was approved in September 2007 and the funding period for INTERREG IVC is 2007-2013. It has a total available ERDF budget of € 321 million for this period. The programme is structured around two thematic priorities: a) "Innovation and knowledge economy" b) "Environment and risk prevention"
Eligibility criteria	Due to the strategic approach of the INTERREG IVC programme, regional and local public authorities represent the main target group of the programme. The INTERREG IVC programme would be an appropriate funding mean for several actions proposed by the current project, such as the organisation of workshops on climate change adaptation with participants from all countries of a region (the workshop may focus on information exchange or to the investigation of specific measures). The IVC interface promotes cooperation and facilitates decision making in a regional level. Also exploiting existing tools, such as web platforms as a more permanent way to maintain interest and focus to the regional cooperation (these tools could function as ad hoc information exchange facilitators) could be funded. In general, both workshops and tools help countries pinpoint their similarities and differences, isolate appropriate measures and cooperate with their neighbours towards a comprehensive regional approach that includes possible synergies among authorities.
Geographical zone	All 27 EU members as well as Norway, Switzerland

[23] EC (2011)

Source	http://i4c.eu/
Funding instrument	**Programme Med**
Description	*Programme financed by ERDF + IPA (Instrument for Pre – Accession Assistance). Aims at strengthening the European competitiveness through regional competitiveness, employment and sustainable development.*
Size & type of available funds	The current phase of the programme runs from 2007 – 2013. With a budget of more than 250M€ (whose 193M€ of ERDF), the Programme runs, until exhaustion of its ERDF envelope. The current period's CCA - related project funded by the Med Programme, regards: "Prevention of maritime risks and strengthening of maritime safety".
Eligibility criteria	Regions and town administrations, research centres and national authorities in charge of related sectors, universities as well as non - profit making associations, represent the main target group of the programme. Partners from 13 countries including the whole Northern Mediterranean seacoast are working together to strengthen the competitiveness, employment and sustainable development of this area. The transnational setup allows the programme to tackle territorial challenges beyond national boundaries, such as environmental risk management, international business or transport corridors. The programme's objectives are to improve the area's competitiveness in a way that guarantees growth and employment for the next generations (Lisbon strategy) and to promote territorial cohesion and environmental protection, according to the logic of sustainable development - Goteborg strategy. In the field of climate change adaptation, through this programme Renewable Sources of Energy as well as Green technologies could be broadly promoted in the northern Mediterranean area.
Geographical zone	The whole Northern Mediterranean seacoast (13 countries of which 9 are EU members)
Source	http://www.programmemed.eu/index.php?id=5175&L=1
Funding instrument	**LIFE+**
Description	*LIFE is the EU's financial instrument supporting environmental and nature conservation projects throughout the EU, as well as in some candidate, acceding and neighbouring countries. The programme is financed by EU.*
Size & type of available funds	The current phase of the programme, LIFE+, runs from 2007-2013 and has a budget of €2.143 billion. The CCA - related projects that are funded the current period by "Life+", regard: a) "Nature and biodiversity" b) "Environment policy and governance" c) "Information and communication"

Eligibility criteria	The general objective of LIFE+ is to contribute to the implementation, updating and development of EU environmental policy and legislation by co-financing pilot or demonstration projects with European added value. LIFE+ would be a central funding tool for pilot implementations of the innovative actions formulated at public scale in the framework of the current project. Projects must be of EU interest, making a significant contribution to the achievement of the general objective of LIFE+; They must be technically and financially coherent and feasible and provide value for money; Where possible, projects should promote synergies between different priorities under the 6th Environmental Action Programme, and integration.
Geographical zone	All 27 EU members
Source	http://ec.europa.eu/environment/life/
Funding instrument	**7th Framework Programme**
Description	*FP7 is the short name for the Seventh Framework Programme for Research and Technological Development. This is the EU's main instrument for funding research in Europe. FP7 is also designed to respond to Europe's employment needs, competitiveness and quality of life.*
Size & type of available funds	The programme runs from 2007-2013 and has a total budget of €50.5 billion. The CCA - related projects that are funded by FP7 the current period, regard: a) "Research Infrastructures" b) "Marie Curie actions" (supports the training, mobility and career development of researchers)
Eligibility criteria	The broad objectives of FP7 have been grouped into four categories: Cooperation, Ideas, People and Capacities. For each type of objective, there is a specific programme corresponding to the main areas of EU research policy. All specific programmes work together to promote and encourage the creation of European poles of (scientific) excellence. The 7th Framework Programme could therefore cover any research efforts required for further climate change investigation. Any company, university, research centre, organisation or individual, legally established in any country, may participate in a collaborative project (known as an indirect action) provided that the minimum conditions laid down in the Rules for Participation in FP7 (RFP), Chapter II, Section 1, p.12, have been met, including any additional conditions laid down by specific programmes or individual work programmes (see Article 12 of RFP).
Geographical zone	a)"The EU-27" b)"Associated countries" c)"Candidate countries" d) "Third countries"
Source	http://cordis.europa.eu/fp7/understand_en.html

Funding instrument	**Cohesion Fund**
Description	*The Cohesion Fund is a structural instrument that helps the less developed Member States to reduce economic and social disparities and to stabilise their economies.*
Size & type of available funds	The current phase of the programme runs from 2007 – 2013 and has a total budget of EUR 61.6 billion. Related projects funded by this instrument regard major transport and environmental protection infrastructures.
Eligibility criteria	Projects to be eligible must belong to one of the two categories: a) Environment projects helping to achieve the objectives of the EC treaty and in particular projects in line with the priorities conferred on Community Environmental policy by the relevant Environment and Sustainable Development action plans. The Fund gives priority to drinking-water supply, treatment of wastewater and disposal of solid waste. Reforestation, erosion control and nature conservation measures are also eligible. b) Transport infrastructure projects establishing or developing transport infrastructure as identified in the Trans-European Transport Network (TEN) guidelines.
Geographical zone	The new Member States plus Spain, Greece and Portugal
Source	http://ec.europa.eu/regional_policy/funds/procf/cf_en.htm and http://europa.eu/legislation_summaries/agriculture/general_framework/g24233_en.htm

Funding instrument	**The Marguerite infrastructure fund**
Description	*International fund established by long-term institutional investors from both the public and the private sector aiming at financing greenfield projects.*
Size & type of available funds	Currently approximately 700m EUR are available for investments. The total fund size is expected to reach 1.5 billion EUR by the end of 2011; 25-35% will be invested in energy projects and another 35-45% in RES projects.
Eligibility criteria	Minimum investment of 10m EUR and a maximum of 10% of the total fund size. Priority will be given to medium and large size greenfield infrastructure projects, including energy (TEN-E) initiatives. Assets need to be located on EU territory. Pilot projects developing experimental or non-tested technologies are excluded.
Geographical zone	EU members
Source	http://www.margueritefund.eu/index.php?pageid=1

Funding instrument	**European Bank for Reconstruction and Development**
Description	The bank provides financing to banks, industries and businesses, as well as new ventures and investments in existing companies, including also in publicly owned companies.
Size & type of available funds	Funds available for direct investments go from 5m EUR to beyond 200m EUR. EBRD provides loans, equity finance, guarantees, leasing facilities and trade finance.

Eligibility criteria	Financing is typically limited to a maximum of 35% of the total project cost. Environmental and social standards requirements apply to projects financed.
Geographical zone	29 countries from central and eastern Europe to central Asia (Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Mongolia, Montenegro, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan)
Source	http://www.ebrd.com/pages/homepage.shtml
Funding instrument	**European Investment Bank**
Description	*Owned by the EU27 MS, the bank makes available long term finance to large capital investment projects*.
Size & type of available funds	At least 75 billion EUR will be available for trans-European transport projects in the period 2004-2013. EIB offers large long maturity loans with an option for either fixed or variable interest rate.
Eligibility criteria	Compliancy with EU environmental principles and standards.
Geographical zone	EU members + the enlargement area of South (East Europe & Iceland), The Mediterranean neighbourhood, EU eastern members, Central Asia, Africa, Caribbean and Pacific, South Africa, Asia and Latin America
Source	http://www.eib.org/
Funding instrument	**European Neighbourhood and Partnership Instrument (ENPI)**
Description	*A dedicated EU funding instrument aiming at promoting sustainable development and approximation to EU policies and legislation in European Neighbourhood Policy (ENP) countries. Part of the available funds is to be provided for the integration of energy networks.*
Size & type of available funds	For the period 2007-2013, the available budget is approximately 12 billion EUR.
Eligibility criteria	Projects should address the priorities identified in the ENP Action Plans agreed with the authorities of the implementation country. Standard EC procurement rules apply.
Geographical zone	27 EU members + Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Israel, Jordan, Lebanon, Libya, Moldova, Morocco, Palestinian Authority of the West Bank and Gaza strip, Russian Federation, Syria, Tunisia, Ukraine
Source	http://ec.europa.eu/world/enp/funding_en.htm http://ec.europa.eu/world/enp/pdf/oj_l310_en.pdf
Funding instrument	**ESPON 2013**

Description	*This instrument supports policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory. The programme budget is part-financed at the level of 75 % by the E.R.D.F. under Objective 3 for European Territorial Cooperation. The rest is financed by 31 countries participating.*
Size & type of available funds	The current phase of the programme runs from 2007 – 2013 with a budget of 47 million euros. The CCA - related projects that are funded by ESPON 2013 the current period , are: a) "Applied Research" projects b) "Targeted Analyses" c) "Transnational Networking Activities by the ESPON Contact Point network"
Eligibility criteria	The mission of the ESPON 2013 Programme is to: “Support policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory by (1) providing comparable information, evidence, analyses and scenarios on territorial dynamics and (2) revealing territorial capital and potentials for development of regions and larger territories contributing to European competitiveness, territorial cooperation and a sustainable and balanced development”. The actions carried through under the programme include different, however strongly interrelated operations: The Programme co-finances projects in fields of: Applied research on different themes of European territorial dynamics, Targeted Analyses, Scientific Platform, Transnational Networking Activities by the ESPON Contact Point network. Specifically the proposed activities in the fields of infrastructure (e.g. systems enabling efficient response, wireless network, etc.), technology (e.g. effective modelling of climate change), exploring potential climate change impacts and vulnerabilities and identify priority concerns could be targeted through ESPON. It is necessary to gain a better understanding of how and in what way climate change will affect the services, social groups, economic sectors and assets in a given region from a short- and long-term perspective. Therefore a wide spectrum of adaptation options should be explored. Depending on the particular aspects of given climate change impacts, it is necessary to figure out various adaptation options in the following areas: technology, infrastructure, organization, ecosystems, socio-economic groups, behaviour, etc. ESPON could help to prioritise adaptation options: In order to assess adaptation options, stakeholders will look at the different criteria, such as: importance, effectiveness, urgency, sustainability, co-benefits and side-effects, reversibility, flexibility, resilience and robustness political and cultural context. The projects must cover research areas in order to support policy development related to territorial development and cohesion. The focus is on territorial structures, trends, perspectives and impacts of sector policies.

Geographical zone	27 EU Member States + Iceland, Lichtenstein, Norway and Switzerland
Source	http://www.espon.eu/

Funding instrument	**JASPERS**
Description	*A Cohesion Policy joint initiative, this partnership, established in 2006, among the EC (DG Regional Policy), the EIB, the EBRD and KfW, offers technical assistance to the new MS to prepare major project for EU support. TENs are included among the key areas of focus of JASPERS.*
Size & type of available funds	Indirect, fully covering the technical assistance required at any stage of project cycle.
Eligibility criteria	The aim is to increase the quantity and quality of projects to be sent for approval to the services of the Commission, to improve the quality of technical advice available to project promoters and to enhance economic growth and job creation. JASPERS focuses its action on large projects supported by the EU funds (costing more than €50 million). In the smaller countries where there will not be many projects of this size, JASPERS will concentrate on the largest projects. JASPERS can make a major contribution to the quantity, quality and rapidity of projects. The assistance, provided is free of charge, is geared towards accelerating the absorption of the available funds and it concerns all stages of the project cycle (from the initial identification of a project through to the decision to provide EU grant assistance and, in some cases, advice can be provided until the start of the construction phase). Project applications are reviewed by JASPERS together with DG REGIO and the Managing Authority of the MS involved, on the basis of project maturity and relevance to EC and country priorities. Only large scale projects of over 25-50m EUR are reviewed, with some exceptions in the case of small-sized countries.
Geographical zone	The 12 Central and Eastern "new" EU Member States (Bulgaria, Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia)
Source	http://www.jaspers-europa-info.org/

Table 8. Inventory of LRA networks and alliances active in Climate change Adaptation initiatives

Institution	***Description***
ICLEI – Local Governments for Sustainability	International association of Local Governments who have made a commitment to sustainable development.
EUROCITIES	Network of major European cities, bringing together the local governments of more than 140 large cities in over 30 European countries.
COMO - The Covenant of Mayors Office	EC Energy policy initiative managed by a consortium of local and regional authority networks.
AER - Assembly of European	Independent network of European regions, with over 270

Institution	*Description*
Regions	regions from 33 countries and 16 interregional organisations as members.
UCLG - United Cities and Local Governments	International organisation representing local governments, with cities and national associations of local governments as members.
World Mayors Council on Climate Change	Alliance of committed local government leaders advocating an enhanced recognition and involvement of Mayors in multilateral efforts addressing climate change and related issues of global sustainability.
FEDARENE - European Federation of Regional Energy and Environment Agencies	European network of regional and local organisations that implement, coordinate and facilitate energy and environment policies.
Energy-Cities	European Association of local authorities, representing more than 1,000 towns and cities, active in shaping their energy future.
ISLENET - European Islands Network on Energy and Environment	Network of European Island Authorities promoting sustainable and efficient energy and environmental management (initiative of the Islands Commission of the Conference of Peripheral and Maritime Regions, supported by the EU Institutions and the Western Isles Council).
C40 Climate Leadership Group	Group of large cities committed to tackling climate change.
ManagEnergy	Technical support initiative of the Intelligent Energy - Europe (IEE) EC programme aiming at assisting actors from the public sector, and their advisers, working on energy efficiency and renewable energies at the local and regional level.
Council of European Municipalities and Regions	Organisation of European local and regional governments, with over 50 national associations of towns, municipalities and regions from 38 countries, representing together some 100,000 LRAs.
UBC EnvCom - Union of Baltic Cities Commission on Environment	Voluntary, proactive network mobilising the shared potential of over 100 member cities for the environmentally sustainable development of the Baltic Sea Region.
Climate Alliance	European network of local authorities committed to the protection of the world's climate.

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