

European Climate Change Programme

**Working Group II
Impacts and Adaptation**

**Marine and Coastal Zones
Sectoral Report**



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The EU's Adaptation Programme

Adaptation is a new policy area for the European climate change policy. The Impacts and Adaptation Workgroup has been set up as part of European Climate Change Programme (ECCP II). The main objective of the workgroup is to explore options to improve Europe's resilience to Climate Change Impacts, to encourage the integration of climate change adaptation into other policy areas at the European, national and regional level and to define the role of EU-wide policies complementing action by Member States.

The aim of this initial programme of work is to identify good practice in the development of adaptation policy and foster learning from different sectoral experiences and explore a possible EU role in adaptation policies.

The Commission has led a series of 10 sectoral meetings looking at adaptation issues for different sectors. One of these meetings looked at the impacts on marine resources and coastal zones and tourism in particular. This report summarises the state of play in the marine resources sector in relation to adaptation to climate change on the basis of the information gathered at the stakeholder meeting on April 12, 2006.

Key impacts of climate change on marine resources

Surface water temperatures have been increasing, as the sea water has been taking up heat from the atmosphere. Recent estimates suggest that sea surface temperatures have risen by about 0.6 degrees over the past 140 years, which is similar to warming over land area surfaces. However, the total heat uptake of the ocean is larger, as the oceans contain much more energy than the atmosphere.

The PESETA project suggests that considerable physical impacts along Europe's coast can occur as a result of climate change. Such impacts include land loss due to submergence and erosion, loss of property and infrastructure by coastal erosion, wetland loss, change in average flood levels and number of people affected. In particular, protecting human use and sustaining the natural functioning of the coast can be conflicting goals, which forms an important challenge to coastal policy.

The following impacts have been projected for the future:

- thermal stratification that may isolate deeper waters that are important in supplying nutrients to shallower areas,
- some plankton communities have shifted in distribution almost 1000 km northwards, and many southern species of fish are also now found much further north,
- the timings of availability of food species of plankton might also be altered, thus affecting fish stocks further, through a "trophic mismatch".

The following factors are important for considering impacts and adaptation in the marine environment:

- presence of suitable habitats for range extension,
- temperature effects on life cycle stages,
- hydrographical conditions, such as the direction of currents,
- geographic barriers,
- water quality.

Global carbon dioxide (CO₂) concentrations in the atmosphere have been increasing, from 280 ppmv (parts per million by volume) in pre industrial times, up to 380 ppmv today. A direct effect of increasing carbon dioxide concentrations that are beyond the absorption capacity of natural systems is that the acidity of the oceans is increasing. Species that have calcium carbonate skeletons and shells may be unable to build those structures, in a worst-case scenario. Additionally, extreme weather events may threaten coastal zone stability and safety.

The PESETA study indicates that the tourism sector has shown to be sensitive to climate change, and there are both negative impacts as well as opportunities. The annual visits of northern Europeans to the countries of the Mediterranean coast comprise the largest flow of tourists on the planet. It accounted for one-sixth of all tourist trips in 2000. A climate-induced change in this flow of tourists would have a very important impact on the destinations. It is expected that climate change will impact on spatial and seasonal distributions of tourism and thus costs and benefits. The biggest impact will probably consist of tourists travelling to other destinations, as temperatures in some places will be too high. As a consequence, many destinations, in particular in southern Europe, will suffer, whereas other destinations, with cooler temperatures, will gain. In addition, extreme events are an important element of consideration by the tourism sector.

All European coastal states are to some extent affected by coastal erosion. According to an inventory in the EuroSION project¹, about twenty thousand kilometres of coasts, corresponding to 20 %, faced serious impacts in 2004. Most of the impact zones (15,100 km) are actively retreating, some of them in spite of coastal protection works (2,900 km). In addition, another 4,700 km have become artificially stabilised. The area lost or seriously impacted by erosion is estimated to be 15 km² per year. Within the period 1999-2002, between 250 and 300 houses had to be abandoned in Europe as a result of imminent coastal erosion risk and another 3,000 houses saw their market value decrease by at least 10%. These losses are, however, insignificant compared to the risks of coastal flooding due to the undermining of coastal dunes and sea defences. This threat has the potential to impact on several thousands of square kilometres and millions of people.

Over the past 50 years, the population living in European coastal municipalities has more than doubled to reach 70 millions inhabitants in 2001 and the total value of economic assets located within 500 meters from the coastline have increased to an estimated 500-1000 billion euros in 2000.

Existing/relevant policies at the EU level

There is a wide range of tools already available at the European level to manage coastal areas and marine waters and that can and should be applied to minimise impacts of climate change.

The EU has proposed an Integrated-Coastal Zone Management (ICZM) for the EU in 2000 (COM(2000)547 final). The key connections between ICMZ and climate change adaptation are the aspects of long-term and cross-sectoral planning and the fact that natural dynamics are taken into account. Also, very similar processes can be seen for risk management in ICZM and climate change adaptation. A recommendation on ICZM was made in 2002 (2002/413/EC).

¹ www.euroSION.org.

The Water Framework Directive (Directive 2000/60/EC) and the Nitrates Directive² (Directive 91/676/EEC) are the most important tools for water quality management in the EU.

In 2005, the Commission has proposed a Marine Strategy Directive to address environmental protection and conservation of the marine environment in marine waters not covered by the Water Framework Directive. Through the Marine Strategy Directive climate change should be fully taken into account in the development of regional marine strategies, including programmes of measures to be developed to achieve 'good environmental status' of the marine environment – the end objective of the Directive.

The Marine Strategy will deliver the environmental pillar of a broader, EU Maritime Policy currently under development. The Commission adopted a Maritime Policy Green Paper in June 2006³ (COM(2006) 275 final) as a first step towards the development of this new policy. The Green Paper recognises climate change as a major threat, and adaptation to changing coastal risks in Europe is discussed. The Green paper is undergoing a consultation process from June 2006 to 30 June 2007.

The Common Fisheries Policy (CFP) has a key role in managing fish populations and to the extent that climate change affects fish stocks, should take climate change into account.

Other important EU policy related to the coastal environment include:

- Environmental Impact Assessment Directive,
- Strategic Environmental Assessment Directive,
- the Habitats and Birds Directives.

Examples of existing initiatives at Member State level

There is no comprehensive overview on adaptation measures in the coastal zone on all Member States. Some examples from Member States (as presented at the meeting) included the following:

Within the SIAM project, Portugal has studied the potential impacts of climate change on fish stocks. The project also identified adaptation strategies for the fisheries sector, such as the exploration of new fishing banks, the development of multi-capacity fleets, the exploration of new fishing areas, and stronger enforcement procedures, etc.

In France, a project was carried out that aimed at observation of the effects of coastal erosion and flooding in low-lying coastal areas and establishing scenarios for the effects of erosion and flooding on land by 2100. One of the activities carried out by the Conservatoire du Littoral is to buy land on the coast and to protect these areas from building and becoming artificial.

Poland has developed a long-term strategy for coastal protection for the coming 50 years, with a view towards 2100. The coastline along selected parts of the coast is to be maintained, while managed retreat is foreseen along other parts. Development in the coastal belt will be controlled, and construction practices should take into account possible increases in sea level and flooding.

² <http://ec.europa.eu/environment/water/water-nitrates/directiv.html>

³ http://ec.europa.eu/maritimeaffairs/communication_en.html

In The Netherlands, for centuries experienced with sea defence there is a new policy trend to go beyond just battling with the water towards increasing awareness of flood risks, and accommodating space for flood water with active retreat. The Dutch government is preparing a climate change adaptation agenda for 2007-2015.

Gaps identified

At the EU level, there are a number of policy instruments for taking forward the adaptation agenda, but an assessment is needed on how they should be used and whether they would need either legal amendments or a different way of application. In case of specific implementation this work should be the responsibility of Member States.

Although a number of current EU policy instruments and directives may be considered to be appropriate and sufficient for facilitating resilience to climate change, certain policies may lack specific guidance or in some cases, the flexibility needed for adaptation (for instance, the Natura 2000 protected areas for biodiversity are statically defined). In the light of adaptation to climate change impacts, policy approaches relevant for adaptation (in particular instruments that influence physical planning or management of landscapes like the Common Agricultural Policy (CAP) and Natura 2000 should be revisited and debated.

There is not a single leading organisation in coastal zone management, often making it unclear who is responsible for regulations. For instance, it is currently not clear who should be regulating the import or spread non-native species but the opportunity to do so exists.

Getting a better grip on the implications for spatial planning is considered a major challenge for many Member States. There is a lack of knowledge at the local and regional scale, and a lack of human and financial resources for this purpose. Member States should be encouraged to develop long-term strategies for coastal protection with a view towards 2100.

The Conference of Peripheral Maritime Regions of Europe (CPMR) has held a questionnaire among its member regions. Many maritime regions include climate change in their policy, or have begun to examine the issue. However, major obstacles for inclusion of climate change in local planning include lack of cohesion and shared priorities between departments at national level, lack of powers at regional and local level, insufficient awareness, and lack of information and coordination.

There is a research gap in relation to fisheries and climate interactions, as well as other marine species.

Opportunities for the EU level

Information and knowledge

The EU could have a major role in awareness raising. The EU could support improved levels of implementation of adaptation resulting from sharing of experiences and information and the joint development of best practices.

An EU demonstration programme on climate change adaptation over a long period of time could help to illustrate approaches to adaptation and support the sharing of

information, knowledge, experiences and best practices on adaptation measures. For example, a number of Member States are already developing adaptation strategies, experiences of which can be shared. Data sharing could be also improved, possibly with support at the EU-level.

Stakeholder involvement and public awareness are imperative especially with regard to spatial planning and biodiversity, as behavioural changes are understood to be particularly important for these areas.

More detailed assessment tools need to be developed that allow the implications of adaptation and mitigation policies for Europe to be assessed collectively. This could be based on a mapping exercise using GIS tools and remote sensing data to determine the degree of geographical and topical coverage of the climate impacts and combined with impact assessment tools as exemplified by the global DIVA tool used in the PESETA project. The ongoing directive on an infrastructure on geographical information (INSPIRE)⁴ should enhance and streamline the information necessary for land use planning and decision-making.

Long-term data collecting is critical for the accurate assessment of changes but is currently being restricted. Both key areas could be facilitated by GMES projects.

More research is needed on the impacts of climate change on fisheries, as well as other marine species.

Policy planning process

The instruments available at EU level might have a key role in the overall planning of coastal zones and marine areas, and in trans-boundary land use issues. Therefore, climate proofing of existing legal instruments would often be more adequate than creating a new "Adaptation Directive". There is a clear need for undertaking such a review of existing instruments - a kind of climate-proofing exercise for the 'acquis communautaire'. Sectoral policies have the key role to play in climate adaptation, and the EU could indicate how different directives could be expanded to include climate change adaptation. There is a need to facilitate discussions and processes for such an integration of policy goals.

In some cases, rather than waiting for the critical directives currently under development to become fully established, there appears to be an opportunity to integrate climate adaptation into the relevant directives at the earliest possibility.

For example, the current WFD and proposed Flood Directive, Marine Strategy Directive and Soil Directive can cover many of the necessary legislation for measures for climate change adaptation for coastal areas and marine waters. Besides, many marine resources related issues are location and context specific. In those cases, these require guidance for implementation of legislation and rather measures at the local level. For instance, within the Water Framework Directive, and the proposed Marine Strategy Directive, the definition of baselines for good environmental status will need to take into account the impacts of climate change.

Cross-sectoral issues must be properly addressed, in particular in relation to the coastal agenda and the freshwater agenda, and the coastal agenda and the biodiversity agenda and fisheries policy

⁴ www.ec-gis.org/inspire/

Research needs identified through the green paper development should be communicated to the relevant ongoing research programmes, such as the ADAM project. Training of staff for implementing the respective EU directives may be needed.

Economic stimuli

A socio-economic perspective should be more frequently used in the spatial planning and for decision on investments in the coastal and marine areas. This has been illustrated for example in the INTERREG MESSINA project⁵, where recommendations are given based on joint European experience.

The adaptation agenda should be linked to the mitigation agenda, in order to gain synergies between measures, and more support for adaptation, as mitigation efforts may already be further developed. For example, wind farms have been proposed or are being developed in the coastal zone for the generation of climate neutral energy. There is an opportunity to assess potential climate impacts as well.

Disaster and risk management

Regarding flood risk and coastal erosion management, work on climate change in the coastal zone could be integrated with an understanding of the overall coastal policies in operation. There may be a place for funding structures in relation to flooding and coastal erosion or related plans.

Actions relevant at national/regional/local level

Actions that are most relevant at the regional and local are the inclusion of climate change issues in spatial planning and coastal zone management plans.

The review of the Habitats and Birds directives in the light of climate change considerations can largely be considered a Member State level responsibility. However, an EU-level approach could help the Member States to include consideration of adaptation to climate change.

Regional strategies should address climate change and the tourism sector. Less vulnerable locations could be promoted, and effective marketing would be important to sustain the sector. In the area of tourism, tourists could adapt by travelling to the traditional holiday destinations during non-traditional seasons, during spring and autumn. Adequate planning and investments strategies preparing for and facilitating the holiday in non-traditional seasons could facilitate this.

Further references and weblinks

Marine and Coastal Dimension of Climate Change in Europe – A report to the European Water Directors, produced by the Joint Research Centre

http://ies.jrc.ec.eu.int/fileadmin/Documentation/Reports/Varie/cc_marine_report_optimized2.pdf

The Future Oceans – Warming Up, Rising High, Turning Sour – A special report by the German Advisory Council on Global Change (WBGU)

http://www.wbgu.de/wbgu_sn2006_en.pdf

⁵ www.interreg-messina.org