

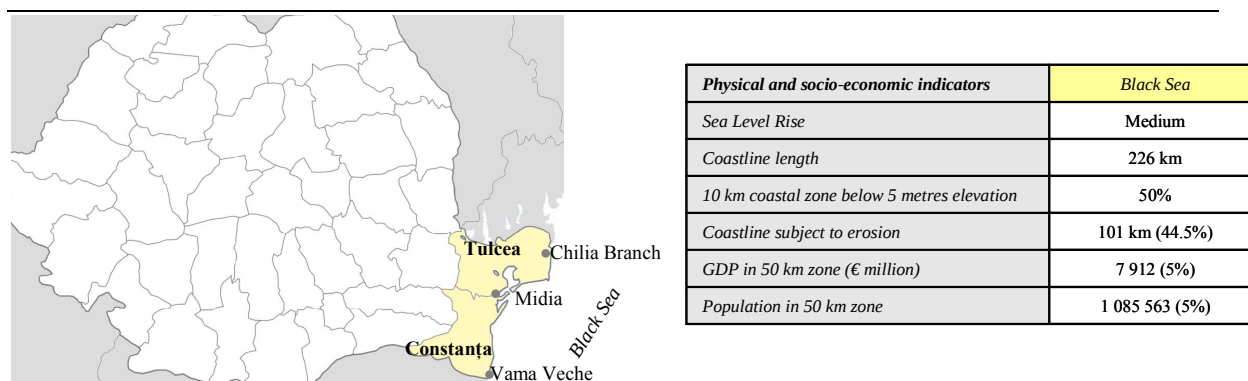
17. ROMANIA

This country fiche provides a comprehensive overview and assessment of climate change adaptation in Romania. After detailing the vulnerability of Romania's coastal zones, the responsibility and financing for coastal protection is explained. Next, the fiche presents the relevant research activities, the coastal defence, risk reduction and adaptation plans available in Romania as well as the current and future protection and adaptation expenditure. The persons contacted and sources of information used have been listed at the end.

17.1. VULNERABILITY OF ROMANIA'S COASTAL ZONES TO CLIMATE CHANGE

The Romanian Black Sea coast is divided into two management units: The *northern unit* which is the deltaic coast of the Danube running from the Chilia Branch to Midia and the *southern unit* extending from Midia to Vama Veche at the border with Bulgaria. The southern unit covers the port areas Midia, Constanța and Mangalia as well as the touristic beaches of Mamaia, Eforie, Constinești and Vama Veche. In total, the Romanian coastline measures approximately 220 km. The Romanian coastal zones, situated along the counties Tulcea and Constanța are presented in *Figure 17-1* together with an overview of the main physical and socio-economic indicators of the Romanian coastal zones.

Figure 17-1: The Romanian coastal zones and their main physical and socio-economic indicators



Source: Policy Research based on EEA, 2006, *The changing faces of Europe's coastal areas* (for Sea Level Rise and 10 km coastal zone below 5 metres elevation); European Commission (Eurose study), 2004, *Living with coastal erosion in Europe: Sediment and space for sustainability* (for coastline length and coastline subject to erosion); Eurostat 2004 (for GDP and population in 50 km zone)

The following paragraphs describe in more detail the vulnerability of Romania's coastal zones to the risk of flooding and erosion, freshwater shortage and potential loss of eco-systems.

a/ *Flooding and erosion*

The Romanian coast has been subject to serious beach erosion problems since decades. The northern unit, the deltaic coast of the Danube, is most affected. In the last 35 years the shoreline has retreated inland between 180 to 300 meters and 80 ha/year of the beach has been lost. Similar issues have also been noted in the southern management unit, where important economic activities such as tourism are more prevalent. Coastal erosion is not only expected to threaten the tourism industry in the summer season due to loss of beaches but might also endanger the safety of housing and public welfare.

The problem of erosion is expected to become increasingly important partly due to the impacts of climate change and Sea Level Rise (SLR), but perhaps just as critically, if not more, due to the lack of effective coastal planning regulations. A number of constructions has been built in close proximity to the shoreline or even on the beach.

Erosion, together with storm events and rivers draining in low-lying coastal areas, is furthermore the main factor triggering coastal flood-risk. SLR, although expected to be modest for the Black Sea, could threaten coastal zones with permanent flooding in the long-term particularly as tides are non-existent and currents are very weak along the Romanian coastline.

Although erosion is a serious problem along the Romanian coastline, flash floods as well as droughts and desertification are the most serious climate change risks threatening the country as a whole.

With increasing desertification since the 1980s, climatic studies¹ indicate that Romania has been affected by drought annually and by extreme drought every four to six years with significant environmental and social implications. In 2007, 34 out of Romania's 41 counties suffered from severe drought and were declared to be in a state of disaster. More than a third of total arable land was affected and millions of hectares of crops were destroyed. This is particularly significant for Romania where almost half of the population lives in the countryside. The government estimated the damages to be € 1.5 billion.

As to flooding, there have been some catastrophic floods in recent years (e.g. 2005 and 2006) which resulted in significant human, economic and ecological losses. Moreover, the frequency and proportion of these floods seems to increase. These flood events are assumed to be the result of climate change as well as anthropogenic activities such as modifications in riverbeds and unauthorised land clearance. The most vulnerable areas of Romania are however situated more inland.

b/ *Freshwater shortage*

Romania is endowed with all types of freshwater resources, such as rivers, natural and artificial lakes as well as groundwater. The largest freshwater resource originates from the Danube and other rivers. The usable water resources represent however only half of the European average². This is largely due to the widespread contamination of water reserves caused by the domestic, industrial as well as agricultural sector. Insufficient consideration is given to environmental protection measures such as adequate wastewater infrastructure.

In addition, only 65% of the population is connected to public water supply networks, which again is very low in comparison with the European average. Also the management of water utilities is poor due to the high fragmentation of water systems in small and medium towns which have limited financial capacity to maintain and develop their water and wastewater infrastructure.

This poor situation has been aggravated by the severe drought events of the past years. The potential impact of persistent drought events for the water sector in Romania has not been researched yet.

c/ *Loss of coastal eco-systems*

Romania has a very high biodiversity level, particularly in coastal eco-systems. Besides lakes and forests, Romania hosts the most important wetland in Europe, the Danube Delta. The Danube Delta represents a nature reserve with a highly diverse fauna and flora unique in Europe and it is the only

¹ www.meteoromania.ro.

² Total usable water resources in Romania is 2,660 m³/inhabitant/year, the European average is 4,000 m³/inhabitant/year following Government of Romania, Ministry of Environment and Sustainable Development, 2007, *Sectoral Operational Programme Environment 2007-2013*.

delta in the world declared as a Biosphere Reserve. The delta nature reserve became part of the UNESCO list of World Heritage Sites in 1991.

As described above, the Danube Delta nature reserve, situated in the northern unit of Romania, is heavily exposed to erosion which may be aggravated by climate change. To conserve and protect the reserve the Ministry of Environment appointed the Danube Delta Biosphere Reserve Authority.

17.2. RESPONSIBILITY AND FINANCING FOR COASTAL PROTECTION AND CLIMATE ADAPTATION

In Romania, coastal protection is a national matter. All beaches and coastal cliffs fall under the public domain for which the *Ministry of Environment and Sustainable Development* is the responsible government authority. Coastal municipalities, towns and communes do not have a specific role in coastal protection.

At the national level, the *Ministry of Environment and Sustainable Development* was designated in 2002 as the national actor responsible for coastal protection and integrated coastal zone management. The ministry was renamed as the *Ministry of Environment and Sustainable Development* (MESD) in 2007.

The ministry's executive agency is the *National Administration of Romanian Waters* (NARW). The NARW constitutes of 11 regional branches, called Water Directorates, responsible for implementing the national water strategy and policy, quantitative and qualitative water management as well as for the operation of water infrastructure (both flood protection as water treatment infrastructures). The *Water Directorate Dobrogea Litoral* deals with the Romanian coastal area.

The Danube Delta coastal zone falls under the authority of the *Danube Delta Biosphere Reserve Authority*, which was created to conserve and protect the reserve for its natural heritage. The authority is also part of the *Ministry of Environment and Sustainable Development*.

17.3. RESEARCH TO ROMANIA'S VULNERABILITY TO CLIMATE CHANGE AND CLIMATE CHANGE SCENARIOS

In Romania, climate change research is coordinated by the Ministry of Environment and Sustainable Development. Two main institutes involved in climate change research are the *National Meteorological Administration* and the *National Institute of Hydrology and Water Management*. Institutes specialised in coastal zone research include the *National Institute for Marine Research and*

Development ‘Grigore Antipa’ and the National Institute for Marine Geology and Ecology ‘GeoEcoMar’.

The *National Meteorological Administration* (NMA) studies the observed changes in main climate parameters such as temperature, precipitation and extreme weather events for Romania. Climate change scenarios have been developed mainly for seasonal precipitation based on the statistical downscaling of 5 global models. The *National Institute of Hydrology and Water Management* deals with the impact of climate change on water resources in river basins in Romania based on the scenarios supplied by the NMA.

Together with the NMA, the National Institute of Hydrology is involved in the EU-funded CICILIA³ and ENSEMBLES⁴ project. CICILIA focuses on climate change scenarios for Romania based on regional models, trends in SLR and the impact on agriculture. The ENSEMBLES project on the other hand aims to develop a model to generate climate change scenarios for precipitation. In addition, the institute takes part in CLAVIER⁵, dealing with the impact and variability of climate change for Central and Eastern Europe.

The *National Institute for Marine Geology and Ecology* ‘GeoEcoMar’ has also been involved in the EU-funded CONSCIENCE⁶ project, aiming to develop and test concepts, guidelines and tools for the sustainable management of erosion along the European coastline. The Danube Delta Biosphere Reserve was one of the pilot sites investigated.

17.4. COASTAL DEFENCE, RISK REDUCTION AND ADAPTATION PLANS IN RELATION TO CLIMATE CHANGE

In Romania, coastal zones are not considered a priority in the national legislation. Nevertheless, projects to counteract erosion in both the northern and southern coastal unit of Romania are currently in progress. In addition, the Danube Delta Biosphere Reserve Authority published a Master Plan in 2005.

The policy document most referred to in the climate change discussion for Romania is the National Climate Change Strategy established for the period 2005-2007. The strategy outlines Romania’s policies to meet the Kyoto Protocol obligations. Although the strategy mainly focuses on mitigation, the potential impacts of climate change are briefly touched upon and reference is made to the need of

³ Central and Eastern Europe Climate Change Impact and Vulnerability Assessment; project timeframe 2006-2009; www.cicilia-eu.org.

⁴ Project timeframe 2004-2009; <http://ensembles-eu.metoffice.com>.

⁵ Climate Change and Variability: Impact on Central and Eastern Europe; project timeframe 2006-2009; www.clavier-eu.org.

⁶ Concepts and Science for Coastal Erosion Management; project timeframe 2002-2004; www.conscience-eu.net.

increasing Romania's knowledge on the economic and social costs of climate change to identify appropriate adaptation measures.

a/ Coastal Protection Plan for southern coastal unit

Upon request of the government of Romania, the Japanese International Cooperation Agency (JICA) prepared a study on the 'Protection and Rehabilitation of the Romanian Black Sea Shore'. The study had the objective to formulate a coastal protection master plan for the southern coastal unit and to propose priority projects stopping coastal erosion and increasing the value of the coastal zone with the creation of new beaches.

The study covered the entire southern unit, with the exception of port areas of Midia, Constanța and Mangalia, and corresponded to almost 60 km coastline⁷. The study area was further divided into the northern sub-unit, with beaches composed of fine sand supplied by the Danube, and the southern sub-unit, mainly composed of cliff coasts with barrier beaches in front of seaside lakes. To develop the plan, JICA studied the wind and wave conditions, as well as tides, water level and beach erosion.

The proposed master plan for coastal protection with a time horizon of 2020, together with the feasibility projects for the priority projects identified for 2010, Mamaia Sud and Euforie Nord, was completed in 2007. For these priority areas, the master plan proposes the installation of new coastal protection infrastructures such as groins, breakwaters, jetties and artificial reefs as well as beach nourishments. Following the finalisation of the strategic environmental assessment, funding has been secured under Romania's Sectoral Operational Programme 'Environment' for the period 2007-2013⁸.

b/ Coastal protection plan for the northern coastal unit

Besides the master plan for the southern coastal unit, in July 2008 the Romanian government started with the first phase of the Black Sea Coastal Erosion Programme COASTEROSION, covering in particular the northern part of the Romanian coastline. The programme focuses on designing and implementing an integrated coastal zone management system that will help to determine potential structural and non-structural coastal erosion control measures.

The first phase of the programme was completed by the end of 2008 and covers an USTDA⁹-funded feasibility study. This study includes the review of relevant reports and existing studies concerning

⁷ The shoreline of the study area is foreseen of various protective facilities such as seawalls, groins and detached breakwaters; occasional beach nourishments were carried out, such as in Mamaia in 1989; the majority of existing protection structures has been deteriorated and is not functioning properly (cf. JICA, 2007, *The Study on Protection and Rehabilitation of the Southern Romanian Black Sea Shore in Romania – Executive summary*).

⁸ Government of Romania, Ministry of Environment and Sustainable Development, 2007, *Sectoral Operational Programme Environment 2007-2013*.

⁹ US Trade and Development Agency.

hydrological and oceanographic information pertaining to the Romanian coastal area as well as an economic, financial and environmental impact analysis of the COASTEROSION programme.

c/ Master Plan for the Danube Delta Biosphere Reserve

In 2005, the Romanian government approved the Master Plan to support the sustainable development of the Danube Delta Biosphere Reserve. This plan will assist the Danube Delta Biosphere Authority, the Tulcea county and the local authorities in:

- Improving the monitoring system for the Danube Delta eco-systems;
- Improving public utilities infrastructure, transport and communication to reduce pollution, the isolation of human communities and to raise living standards;
- Restoring the natural eco-system functions and natural habitats of endangered species from the Danube Delta.

Under the second objective, the protection of the surrounded villages against flooding from the Danube has been incorporated. Climate change has not been referred to in the plan.

17.5. PAST, PRESENT AND FUTURE EXPENDITURE

In Romania, substantial efforts to protect the coastal zones against erosion and related flood-risk have started very recently. In 2008, the total amount for coastal protection was close to € 41 million. This amount mainly entails the implementation of the master plan for the southern coastal unit in Romania. Over the period 1998-2015 expenditures total € 312 million.

For the northern coastal unit, a first feasibility study amounting to € 0.29 million¹⁰ has been carried out. It can be expected that in the coming years, the implementation of a master plan for the northern unit will increase the expenditure to coastal protection in Romania. At present, budgetary information to defend the northern part of the coastline, with the exception of the Danube delta hot-spot, is not yet available.

In the Danube Delta Master Plan, about € 45 million is foreseen to protect the villages around the delta against flooding over the period 2006-2015. Another € 45 million will be dedicated to restore the functions of the natural ecosystems and habitats in the delta¹¹.

More detailed information can be found in *Table 17-1*.

¹⁰ Financed by the US Trade and Development Agency.

¹¹ This amount has not been incorporated in *Table 17-1* as it relates to eco-system protection and not to flooding and erosion; climate change is not taken into account in the current Danube Delta Master Plan.

Table 17-1: Expenditure to protect against coastal flooding and erosion (in € million)

Year	MAINTENANCE EXPENDITURE*	CAPITAL EXPENDITURE		INDIRECT EXPENDITURE****	TOTAL
		Southern coastal unit**	Hot-spot Danube delta***		
1998	< 1	0.00			1.00
1999	< 1	0.00			1.00
2000	< 1	0.00			1.00
2001	< 1	0.00			1.00
2002	< 1	0.00			1.00
2003	< 1	0.00			1.00
2004	< 1	0.00			1.00
2005	< 1	0.00			1.00
2006	< 1	0.00	4.55		5.55
2007	< 1	35.57	4.55		41.12
2008	< 1	35.57	4.55	0.29	41.41
2009	< 1	35.57	4.55		41.12
2010	< 1	35.57	4.55		41.12
2011	< 1	35.57	4.55		41.12
2012	< 1	35.57	4.55		41.12
2013	< 1	35.57	4.55		41.12
2014	< 1	n.a.	4.55		5.55
2015	< 1	n.a.	4.55		5.55
TOTAL	< 18	249.00	45.54	0.29	312.83
		294.54			

* Estimate provided by Dobrogea-Litoral Water Directorate

** The total amount foreseen is € 249 million of which 82% is supported by EU funding under the Operational Programme 2007-2013; the amount has been equally divided over the period 2007-2013 by Policy Research; the total building cost includes € 89 million for jetties, groins and breakwaters, € 65 million for artificial reefs, € 82 million for beach nourishments and € 13 million for the removal of existing facilities and the provision of temporary access roads; engineering services and maintenance costs are estimated to an additional € 69 million

*** Danube Delta Biosphere Reserve Authority and Tulcea county, 2005, Master Plan for the Danube Delta Biosphere

**** Feasibility study for northern coastal segment; info provided by Ministry of Environment and Sustainable Development, Water Resources Management Directorate (average exchange rate 2008: 1€=1.3705\$)

17.6. PERSONS CONTACTED AND SOURCES OF INFORMATION USED

17.6.1. PERSONS CONTACTED

Name	Organisation
Dr Busuioc, Aristita	National Administration Meteorology
Costache, Mihail	Ministry of Environment and Sustainable Development, Water Resources Management Directorate
Dorogan, Dumitru	European Commission DG Environment, Protection of Water and Marine Environment Unit
Frecia, Cristina	Dobrogea-Litoral Water Directorate
Malciu, Viorel	Department Oceanography, Marine and Coastal Engineering
Mihai, Andrei	National Institute for Hydrology and Water Management
Dr Stancia, Adrian	National Institute for Marine Geology and Ecology
Tuchiu, Elena	National Administration of Romanian Waters

17.6.2. SOURCES OF INFORMATION USED

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- www.ddbra.ro, Danube Delta Biosphere Reserve Authority