MODERATION OF THE NATIONAL WORKSHOP IN MONTENEGRO

Deliverable on activity 1.1.1.1 :" *Identify existing CV&C monitoring program and available data in each participating country, as well as options for data sharing in view of developing a multicountry Information sharing portal".*

Project title

"Integration of climatic variability and change into national strategies to implement the ICZM protocol in the Mediterranean"

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Hosted by Montenegro, Kotor, April 11 & 12, 2013.

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Introduction

1. Montenegro is a contracting party to the Barcelona convention. Concerning CVC, the country has adopted a certain number of documents, in particular the following:
   . The national strategy for sustainable development (NSSD) which identifies possible impacts induced by climate change: sea level rise, increase in temperature and change in agricultural and hydrological regime;
   . The introduction and implementation of the Strategy for Integrated Coastal Zone Management which aims at harmonizing NSSD with priorities in the field of climate change;
   . The National Overview on Vulnerability and impact of Climate Change on Marine and Coastal Biodiversity in Montenegro which studies the inter-linkage between climate change and coastal marine biodiversity and gives recommendations;
   . The first National Communication for Montenegro towards UNFCCC (INC) which identifies the potential impact induced by climate change (erosion and sediment deficit, increase flood frequency, inundation of low lying areas, rising of water tables, salt water intrusion and consequent biological effects).
   The National Report concerning CVC in Montenegro finalized in January 2011 synthesizes the available knowledge on the current practice in CC in the coastal zone management.

2. Nevertheless, Montenegro has no national climate change policy as such at the moment. The existing policies and strategies do not explicitly integrate climate variability and change related environmental and socioeconomic indicators into the coastal zone planning and management. But Montenegro is well aware of the CVC effects. The rising trend of air temperature in the 2nd half of the 20th century is evident in most of the country. Summers have been very hot, particularly in the last 18 years. Anomalies of the mean temperature in relation to climatologic norm, range from 90% to 98% for the analysed period 1991-2005. For the next decades, according to the scenarios envisaged, an important increase in temperature is expected in the coastal area as well as an important deficit in precipitation, especially in spring.

3. The Mediterranean Integrated Climate Information Platform (MedICIP) is a first possible answer/tool of the UNEP MAP (Mediterranean Action Plan) and the Plan

Bleu project towards a regional adaptation framework for climate change in the Mediterranean. Its purpose is to "develop knowledge, data acquisition and exchange of information on climate variability and change in the Mediterranean region, on the expected impact (on society, the economy and natural resources), on vulnerability and on adaptation measures; and document good practices of integrated climate risk management and climate adaptation in support to the Integrated Coastal Zone Management (ICZM) in the Mediterranean Basin, to facilitate the information exchange and to enable scientists, the civil society and policy makers to access these data".

4. At the same time, it is important to bear in mind the European context, especially for the North Mediterranean countries involved in MedICIP. In addition to Montenegro, three other countries are involved in the project: Albania, Bosnia and Herzegovina and Croatia, the latest becoming a new EU member country from July 1st 2013. The EU member countries with Mediterranean coastal zones are similarly committed through a European platform called Climate-Adapt.

5. Compared with these nearby countries, Montenegro has no dramatic specificity. It is nevertheless advisable to keep in mind that most of the touristic activities in Montenegro are located in the coastal areas, in particular in the spectacular Mouths of Kotor site. This area therefore represents a huge economic stake for the country. Significantly, the Ministry in charge of tourism is also dealing with sustainable development.

6. This report is representing the results of the national workshop held in Kotor, April 11 & 12 2013, to validate the inputs of the country – in terms of data, indicators, source of information, etc. – to the MedICIP portal.

Objectives and expectations of the workshop

7. The objectives of the workshop are taken from the document that was circulated to the participants with the agenda, and split into three specific objectives.

8. Objective I. Review of existing and missing data with the national report as a starting point
   . Present the main points of the national report prepared during the inception phase;
   . Discuss about the compilation of the existing monitoring programmes on CVC;
   . Select the available data that can be shared in order to feed the MedICIP portal.
   . Identify gaps;
   . Define modalities of data sharing options.

9. Objective II. Present the MedICIP Portal (content, modalities, users' needs)
   . Present and discuss contents of the portal (MedICIP);
   . Analysis of users' needs and meta data: form, (table, graph and links towards reports…) and topic/sector (water, agriculture, tourism).

10. Objective III. Start selecting relevant indicators
    . Review the first selection of indicators;
    . Suggest a core set needed for the country;
    . Discuss indicators and data: which methodology for the selection?

11. The expectations were also clearly presented in the documentation and at the beginning of the workshop.
    . Production of a working factsheet for the analysis of users' needs which will be taken into account in the MedICIP portal items;
    . National report completed with the concerned institutions;
    . Validation, by the participants, of data and gaps highlighted in the report;
    . A draft of a first core set of indicators.

12. The agenda of the workshop is presented in Annex I. In total, 12 experts have attended to the workshop which was co-chaired by Jelena Knezevic, advisor of the Minister for Sustainable Development and Tourism of Montenegro and by Philippe Coste, from Plan Bleu. The next session presents the results of the workshop. The list of participants is attached in Annex II.

Montenegro available data and gaps

13. During the workshop, most of the debate was based on the excellent and comprehensive report presented by Mirjana Ivanov, here attached in Annex III.

14. The data available include: 1) a detailed description of the different technical services dealing with climate change (meteorological and hydrological stations with the area covered and the data collected); 2) a synthesis of the available observations (graph, maps, scenarios, estimated impact of climate change on the coastal area); 3) an identification of the vulnerable areas in the coastal zone (Bojana river and Velika Plaza, Bokakotorska Bay and water spring near the coast); and 4) a detailed description of the administrative services dealing with climate change with an indication of their specific responsibilities.

15. A series of proposals were approved, including in particular: strengthening institutional and technical capacity, developing specific instruments for vulnerability assessment, training of experts and so on (see item 6 of Annex III)

16. The main gaps identified concern the hydro-meteorological monitoring: insufficient number of station collecting the wind data, discontinuity in the measurements, lack of analysis between manual and automatic measurement; rapid decrease in the number of rainfall stations (from 80 to around 20) due to lack of staff and financial problems; weather forecast at the open sea is not satisfactory because a lack of measurements and observations. The lack of experts is another notable bottleneck.

17. There was no particular debate about the modalities of sharing data: the participants seem to agree with a large openness.

Conclusions

18. The main in depth debate which took place during the working session of the afternoon was about how to cross data in indicators. The proposed indicators and the proposed methodology for their selection which was put forwards in section 3 were considered as extremely useful. Nevertheless there was still a question about the transformation of data into indicators. It has been indicated that this question would be transmitted to the Plan Bleu.

19. This particular point set apart, it emerges from the whole workshop that the paper (slides) presented by Mirjana Ivanov and which was used as a basis for all the discussions establishes a very good photography of the current situation with a lot of data that Montenegro is clearly ready to share in view of developing a multi-country information sharing portal.

Annexes

Annex 1. Program of the workshop

Day 1	
9:00-9:30	**Introduction by the host country for opening of the workshop and round table** *(Ms Jelena Knezevic, Plan Bleu's National Focal Point for Montenegro and P.Coste, consultant from PB/RAC)*
9:30-9:50	1. **Presentation of the scope and objectives by Plan Bleu** *(P.Coste, consultant from PB/RAC)* ➢ Reminder of the objectives of the whole project and those of the national workshop. ➢ Agreement on the objectives of the workshop.
9:50-10:00	Discussion
10:00-10:30	**2. Presentation by the expert, author of the national report about « Climatic variability and change into national strategies to implement ICZM Protocol »** *(Mirjana Ivanov, Hydrometeorological Institute of Montenegro)* ➢ Introduction of the main part of the national report. ➢ Presentation of the existing monitoring programmes on CVC. ➢ Presentation of the available data that can be shared and identification of gaps. ➢ Propose modalities for data use and sharing options.
10:30-11:00	Discussion
11:00-11:30	*Coffee break*
11:30-12:10	**3. Presentation of the possible content of the MedICIP portal and the indicators** *(P.Coste, consultant from PB/RAC)* ➢ Presentation of the functionalities and contents of MedICIP. ➢ Presentation of the first possible set of indicators and discussion about the methodology for their selection.
12:10-12:30	Discussion
12:30-14:00	*Lunch time*
14:00-17:30 ***With coffee break 15:30-16:00***	**4. Working session and analyse of users' need** *(Mirjana Ivanov, Hydrometeorological Institute of Montenegro and P.Coste, consultant from PB/RAC)* ➢ Whereupon the presentation of monitoring programmes in countries, data available, gaps,... done the morning by the expert / author of the national report, the assembly could discuss/brainstorm about for instance: - What kind of data will be available and could be exchanged? - In which frame are they? - What are the data networks in the country? - How do they work? - A consensus on data sharing among countries has to be sought.
Day 2 - Morning	
9:00-12:00 ***With coffee break 10:30-11:00***	**5. Conclusion and next steps** *(Mirjana Ivanov, Hydrometeorological Institute of Montenegro and P.Coste, consultant from PB/RAC)* ➢ Presentation and discussion of conclusions - An overview of results. - An overview of the next steps: relationship with the portal and the regional synthesis on CVC data availability and gaps. - Agreement on the distribution of tasks and upcoming events. - Revision of the national report produced during the inception phase of the project.

Annex 2. List of participants

Name	Institution	Field of expertise
Jelena Knezevic	Ministry for sustainable development	Plan Bleu's National Focal Point for Montenegro, Ministry of Sustainable Development and Tourism
Andro Drecun	MORT	Director General for international cooperation and climate change, Ministry of Sustainable Development and Tourism
Dragica Sekuli	Ministry of Economy	
Andrej Lakic	Ministry of Sustainable development and tourism	Assistant on the CAMP project, Ministry of Sustainable Development and Tourism
Dordije Vukilic	Ministry of Sustainable development and tourism	National Coordinator for the development of Second National Communication, Ministry of Sustainable Development and Tourism
Luka Mitrovi		
Mirjana Ivanov	Institut of Hydrometeorology and Seismology	Expert for climate change and climate monitoring, Institute of Hydrometeorology and Seismology, Montenegro
Dusan Slavni	Institut of Hydrometeorology and Seismology	Expert for hydrography and oceanography, Institute of Hydrometeorology and Seismology, Montenegro
Irena Tadic	Ag environmental protection Agency of MNE	Expert for emission inventory, Environmental Protection Agency
Aleksandra Ivanovic	Public enterprise for Coastal zone management	Public Enterprise for Coastal Zone
Mirko Knezevic		
Slavica Kasielan	Institute of Marine biology	Marine biologist, Institute of marine biology
Nebojsa Jablan		
Snezana Marstijepovi		
Duro Pesikan	Jadransko brodogradiliste AD Bijela	Health safety security and environment manager, Shipyard Bijela
Deda Elovi	Luka Bar	
Jadranka Perahovic	Predstavnik opstine Kotor	Biologist, Municipality of Kotor
Vojislav Dragnić-Andrej		molim te pogledaj u listi potpisa,mislim da g.Dragnic nije ucestvovao
Philippe Coste	Plan Bleu's Consultant	

Annex 3. Presentation on Hydrometeorological and hydrographic monitoring on the coastal area of Montenegro, April 11th and 12th, Kotor, 43 slides.

Annex 4. Presentation on Program integralnog upravljanja obalnim područjem Crne Gore , July 2012, Kotor, 17 slides.

Annex 5. Minutes of the Workshop "The identification of the existing monitoring programmes, the available data on climate variability and change (CVC) related to coastal zone and the data sharing options in view of the developing a multicountry information sharing portal", 11th to 12th Arpil 2013, Hotel Vardar, Kotor.

The workshop was chaired by Jelena Knežević who also gave the introductory remarks for the workshop. Ms Knežević pointed out that the aim of the workshop is to make the update on the first National Report produced in 2011 concentrating specifically on the existing monitoring programmes on CVC, data availability and identification of gaps. The workshop itself is organised by Plan Bleu, who are in charge of the follow-up of the design of a regional data sharing portal on climate variability & change (CVC) in the frame of the UNEP/MAP project "Integration of climatic variability and change into national strategies to implement the ICZM Protocol in the Mediterranean", launched two years ago, which is co-funded by Global Environmental Facility.
All national relevant stakeholders and institutions were invited to attend the workshop in order to present them the concept of the Mediterranean Integrated Platform for CVC, what the Platform contains and how we can connect too this system in the sense of exchanging the project result and establish the exchange of data between the national stakeholders and institutions.

Philippe Coste started by stressing out the three main components of the project. Component one is the establishment of the CVC information sharing Platform, component two is strengthening the knowledge base on regional CVC and component three support to implementing Coastal Zone Management Protocol implementation and capacity building. The key issue is to create the meta data base on CVC at the regional level and strengthen coordination and promote better alignment in monitoring.

Mirjana Ivanov, national expert for climate change and climate monitoring, presented the main points of the National Report prepared during the inception phase of the project (i.e. the assessment of the current practice regarding the CVC and country's capacities in dealing with CVC issues), bilateral and multilateral projects on CVC, vulnerability and adaptation measures, vulnerable areas in the coastal zone and existing monitoring programme and impacts. She continued by explaining that a downside to the project is that Montenegro does not have National Climate Change Policy at this moment, but it is planned for the future, and that the existing policies and strategies do not explicitly integrate climate variability and change related environmental and socioeconomic indicators into the coastal zone planning and management.

In continuation Ms Ivanov presented the ways of data collection and storage in the Institute of Hydrometeorology and Seismology (IHMS) which implies collection of hydrological, meteorological, oceanographic, air quality and water quality data from the official national networks. For example, as far as the meteorological data is concerned it is stored in the digital Oracle database (CLIDATA) which is consistent with WMO recommendations.
She also presented the current gaps in hydro meteorological monitoring network in the coastal area, emphasizing the rapid decrease of precipitation stations (which are mostly still manual), and the problems and gaps related to the wind data measurements and the forecast at the open sea, as there is no measurements and observations.
Another key issue that was addressed was related with integration of the CVC into the ICZM strategy in scope of making the vulnerability assessment of the coastal area of Montenegro to the impacts of climate change. Ms Ivanov point up as ongoing activities following projects: CAMP, AdriCosm Intermediate and AdriCosmStar 2 which has intersections with ICZM.

Regarding to this, the results and work that were done in the period after the first National Report concerning CVC up to now, were presented by Ms Knežević. She presented what was done in the vulnerability assessment of the coastal area of Montenegro and of its narrow part within the project CAMP. She explained that the CAMP is a project which presents National Platform how to respond to the challenges and obligations that are defined in the Protocol on Integrated Coastal Zone Management which also provide the sustainable development of the coastal zone in Montenegro. She pointed up that the aim of the CAMP project is also to develop the capacities of the national institutions in sense of creating their capacities in dealing with the challenges faced by the coastal zone. Some of the CAMP results can be used into the system of spatial planning and the establishment of the set-back zone.

The conclusions of the working session of the workshop considering the analysis of the users' needs are following:

1. To define the available data (data set, reports, tables, graphs, etc) / indicators
In order to define the indicators of interest, it is necessary to provide consistency with other relevant set of data and indicators (e.g. National list of indicators, ECAP, EEA core set of indicators, AdriCosmStar data, CAMP).
It is important to define and improve methodologies for calculating indicators. For some sectors there is a need for assistance in identification of indicators. For example:

- For EROSION - there is a need to assess the status (terrestrial and seaside erosion), to collect data, to define indicators, to upgrade the current National Institutional setup; to enforce implementation of LULUCF (e.g. land degradation, land use change, etc.)

Topic/sector (Coastal zone)

For the coastal zone there is a need to extend the monitoring programme of marine ecosystem to territorial waters / epicontinental zone of the marine ecosystem. It could be applied relevant ECAP indicators.

Topic / sector (Climate)
Available indicators in the Climate sector are:

- indicators of extremes events (according to the WMO/CLIVAR)
- SPI
- data related to the climate status
- for GHG emission - tables, graphs and reports are available.

2. To enforce implementation of the landscape convention (particularly through integration of the system of spatial planning);

3. To realize mapping of the coastal landscape;

4. To provide information on vulnerability assessment of the coastal area

Annex 6. Fact sheet reviewed and amended

Montenegro

Context

The Ministry of Sustainable Development and Tourism realizes many activities which directly and indirectly contribute in building capacities for UNFCCC and Kyoto Protocol's implementation on national level.

Operation of studies

- Besides this Ministry, the key responsibility for development, implementation and monitoring policies and measures important for climate change have:
  - The Ministry of economy, especially the sector for energy in the part that refers to energy efficiency and renewable energy sources,
  - The Ministry of Transport and Maritime Affairs,
  - The Ministry of Agriculture and Rural Development.

- It is very important to point out several role of Hydrometeorological Institute of Montenegro HMI.

Data available

- HMI is responsible for:
  - Observing and measuring meteorological, hydrological, ecological and agro meteorological parameters;
  - Analysis, forecast, processing and archiving measured and observed parameters;
  - Monitoring and assessing climate, state of the land, air, surface and underground water and marine coastal zone;
  - Providing meteorological, hydrological, ecological and agro meteorological data and climatic indexes; produces analyses on averages, trends, variability and extremes.
  - HMI collects hydrological, meteorological, oceanographic, air quality and water quality data from its official national networks.

- Meteorological network is consisted of 8 main automatic stations, 20 climatic and 80 precipitation stations.

- **The data are stored in the digital Oracle database**, i.e. for meteorological data, CLIDATA is used consistent with WMO recommendation. It contains hourly data (wind speed and direction), daily data (maximum temperature, minimum temperature, precipitation and sunshine hours), and three times per day measured data (temperature, pressure, wind, sea temperature) as well as relative humidity and visibility.

- Climatic indexes are analyzed according to the WMO CCL/CLIVAR/JCOMM/ETCCDI recommendation

- **Air temperature data** from 1961 to 1990 and 1991-2005. According to the analysis of HMI, rising trend of air temperature in the second half of the 20th century is evident almost in whole part of Montenegro.

- **Annual quantities of precipitations in mm/day**. Annual sums of precipitations oscillate around the normal and mainly do not show any tendency of increase or decrease. Exceptions are the northeast areas of Montenegro, Bijelo Polje (increasing T°) and the coastline (low decreasing T°).

- **Data on SLR** (serious socio-economic implications of sea level rise and climate change are expected: due to the constant inundation of the coast, a significant part of the beaches will be reduced and some beaches will disappear). The results of research show increase of the sea level in the basin of the Mediterranean Sea up to +35 cm for the period 2070-2099 and scenario A2 (INC, 2010).

Data gaps

- Increasing the technical capacities for monitoring and updating basic data sets.

Needs

- Montenegro does not have National climate change policy at the moment.

- Lack of such experiences and capacities, especially in the process of transition to a market economy and with the necessity to accelerate new development cycle; represent a serious risk to sustainable development.

- Up to now there is no vulnerability assessment based on quantitative approach, and no vulnerability maps for the coastal zone in Montenegro that refer to climate change. An exception is delta of the river Bojana which was analyzed within the project AdriCosmStar.

- Limited institutional capacities are one of important challenges regarding the creation of conditions for successful implementation of policies and measures in the field of climate change.

- It is important to strengthen human and technical capacities within overall strengthening of institutional capacities.

- Modern tools for vulnerability assessment are required in almost all vulnerable sectors (hardware, software and training of personnel).

- Training of national experts, both for running of climate change scenarios (models) and for assessment of climate change and variability impacts.

- Training of experts in modern technologies for adaptation, for cost/benefit analysis.

- Finer resolution of regional climate change models as well as methods for simulation extreme weather events.

- Development of socio-economic scenario.

- Production of climate change risk maps.

Strengths

- The National Strategy for Sustainable Development NSSD.

- A new project is expected to start in cooperation with Mediterranean Commission for Sustainable Development. Its aim is to harmonize NSSD with priorities in the field of climate change, especially from the aspect of implementation of adaptation measures on climate change. *(What is the name of this project? And also the aims?).*

- On the First Thematic Conference on Climate Change, in November 2008 in Sarajevo, and adopted South East European Climate Change Framework Action Plan for Adaptation – SEE/CCFAP-A, a Regional Forum on Climate Change was established in August, 2009 with Montenegro as a host country.

- The establishment of the Agency of Environmental Protection in 2009, as an executive body responsible for implementation of environmental legislation was a great advantage in strengthening capacities for dealing with environmental protection, including climate change. It actively participates in CDM's projects planning as a technical operative body.

Monitoring program / national plans and programs for monitoring

- The project within the "Adricosm-Star" initiative with the aim to Integrate climate variability and change and to initiate and improve integrated coastal zone and river basin management using methodologies, regulations and techniques of monitoring, modelling, forecasting, and reporting.

- Vulnerability and adaptation measures in coastal area have been in general defined for the first time in INC.

- National projects: Within Strategic implementation of action plan for Mediterranean biodiversity - SAP/BIO Program, in cooperation with SPA/RAC centre, a Study of climate change impact on marine and coastal biodiversity in Montenegro was prepared. It analyzes climate change impacts on marine and coastal biodiversity.

- Other national and regional projects which include issues of climate change in coastal area are:
  - ADRICOSM-STAR II (extension of the project ADRICOSM-STAR)
  - Preparing Initial National Communication (INC) according to the articles of UNFCCC
  - Second National Communication for Climate Change in the context of implementation UNFCCC
  - Regional program of adaptation on climate change for SEE countries
  - Regional Climate Change Programme for South Eastern European Countries RCCP_SEECs
  - Setting up regional political forum for climate change and regional program (Climate Change and coastal area, Climate Change and Tourism) (under realization).

Network / transboundary / regional networks and structures

- Collaboration between Montenegro and the Republic of Italy in the field of environmental protection, especially important part is referring to strengthening capacity for UN FCCC convention and Kyoto Protocol.

- HMI works on air and water cross-border pollution

- Multilateral projects:

  The process of preparation of the Initial National Communication began in April 2008 and was financially supported by the Global Environment Facility (GEF), through a project of the Montenegrin Government and the UNDP/GEF – "Enabling Activity for the Preparation of Montenegro's Initial National Communication to the United Nations Framework Convention on Climate Change – UNFCCC. The main objective of the project was strengthening of technical and institutional capacity to address climate change issues and their integration into sectoral and national development priorities.

- Regional projects:

  Within SEE/CCFAP, Montenegro resumes obligation to define and implement measures for adaptation in the sector of Tourism and Coastal zone. Thereby, starting from SEE/CCFAP-A, in cooperation with UNDP, a Proposal for regional program on

adaptation's measures is prepared. It is supported within Regional Forum by the countries in the region and deemed in order to ensure IPA funds for its realization.

List of institutions

- Hydrometeorological Institut of Montenegro, Centre for Eco-toxicological Research, Marine Biology Institute, Biotechnical Faculty and Agency for Environmental Protection

- Centre for Eco-toxicological Research is a public institution with a high expertise in analysis of pollutants in different media.

- Marine Biology Institute under the University of Montenegro deals with research of marine animals and plants, sea water chemistry.

- Public Enterprise Morsko dobro fulfil activities in the field of: protection and management of the public maritime domain, construction and maintenance necessary infrastructure.

Vulnerable zones

- **The river Bojana and Velika plaža** – with the sea level rise of 35 cm, natural flow of the river Bojana will be disabled until its estuary into the sea, delta of the river Bojana will disappear, inflow of the river systems which flow into the sea will be disturbed and a big part of the space around rivers will be flooded and lost, particularly where the sea shore is low, like Velika plaža in Ulcinj;

- The course of the river Bojana will be stopped much before, than it is the case today, which means that the whole part of that area, which is now practically on the same level with the river Bojana, will be flooded;

- Due to huge quantities of precipitations in inland mountain areas, enormously big inflow of fresh water is expected in **the waters of the Bokakotorska Bay**. Almost all that water reaches the sea through the surface outflows or underground channels and occupies the upper layer of water. Due to the presence of fresh water in the colder part of the year, when the temperatures are under 0°C, regular process of frosting-icing of the sea will occur which will create enormous consequences for this resource;

The sea water – waves will make a strong pressure on **water springs near the coast** which are used for water supply and a big number of springs will be out of use because they will contain salty water.

Vulnerable sectors

- Coastal agriculture, fishery and tourism or those concerning water availability and human health (INC, 2010).

- Some zones directly along the shore will not be used because of the frequent hit by the waves. Security of infrastructure, ports, breakwaters, marinas, shipyards will be endangered, particularly their normal functioning.

- Security of infrastructure, ports, breakwaters, marinas, shipyards will be endangered, particularly their normal functioning.

- Other socio-economic impacts are those directly affecting economic activities, such as coastal agriculture, fishery and tourism or those concerning water availability and human health (INC, 2010).

Impacts

- Sea level rises, increase in temperature and changes in agricultural and hydrological regime

- Erosion and sediment deficit / increased flood frequency / inundation of low-lying areas / rising of water tables / saltwater intrusion and consequent biological effects.

Scenario

- Climate change impacts on the water quality and sediment transport in the Bojana river and in the Montenegrin coastal area are done using IPCC climate change scenario for the next decades.

- For the climate change scenario until 2100, the regional climate model EBU-POM is used with A1B (as mean) and A2 (as high) scenarios for the period 2001-2030 and 2071-2100 (INC, 2010). According to A1B scenario, the coastal area is affected more in summer by increase in temperature (from +1°C to +2.4°C for the period 2001-2030 and 2071-2100 respectively) than in the winter (+0.5°C to +2.6°C for the period 2001-2030 and 2071-2100 respectively). The spatial structure of the changes in temperature is similar for A2 scenarios but with bigger magnitude of change.

- Regarding the precipitation, it is expected that the highest deficit will be in spring in whole part of Montenegro for the period 2001-2030. A significant deficit during the summer (-50%) and winter (-10%) is expected in the coastal area in the period 2071-2100 (INC, 2010).

- Relative to the sea level rise, there is low confidence level for estimations about future changes of the Adriatic Sea. This problem is related to capacities of global and regional models. Anyhow, the results of research show increase of the sea level in the basin of the Mediterranean Sea up to +35 cm for the period 2070-2099 and scenario A2 (INC, 2010).

For MedICIP: *link towards all the literature*

List of national reports and documents

- Coastal Area Management Programme Montenegro, Feasibility Study
- The first National Communication for Montenegro towards the UNFCCC (INC)
- The Initial National Communication of Montenegro INC to UNFCCC
- National strategy of sustainable development of Montenegro
- National strategy for Integrated Coastal Area Management

List of international reports and documents

- The fourth IPCC Assessment Report, WG II, p.869
- Protocol on ICZM in the Mediterranean
- Official Journal of the European Union 4.2.2009, L 34/19
- Brochier and Ramieri, Climate Change Impacts on the Mediterranean Coastal Zones,Fondazione Eni Enrico Mattei,Tetis,Venice,Italy,April 2001
- Upitnik, Informacija koju od Vlade Crne Gore zahtijeva Evropska komisija u cilju pripreme Misljenja o zahtjevu Crne Gore za članstvo u Evropskoj uniji, Poglavlje 27:Životna sredina
- Report of the World Climate Conference – 3, Working together towards a Global Framework for Climate Service
- South East European Climate Change Framework Action Plan for Adaptation SEECCFAP-A