

“Integration of climate variability and change into national strategies to implement the ICZM protocol in the Mediterranean”

Deliverable on activity 1.1.1.2: “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”

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Table of Contents

- Acronyms 3**
- Introduction 4**
- I. Background, context and rationale for the development of a Regional Data sharing Platform for Mediterranean countries, sectors and stakeholders 6**
 - a. Methodology of work 6
 - 1. National reports and factsheets 6
 - 2. Objectives and process of the workshops 6
 - 3. National reports and regional synthesis 7
 - b. Content of the synthesis 7
- II. State of the general knowledge of the countries of the Mediterranean basin linked to the climate variability and change 8**
 - a. National data networks 8
 - b. National monitoring programs 9
 - c. Climate variability and change data availability 10
- III. Climate variability and change data gaps: lack and skills of the countries of the Mediterranean basin linked to the climate variability and change 11**
 - a. Bottlenecks identified 11
 - b. Data still to be developed 11
 - c. Specificity and disparity between the countries 12
- IV. Development perspectives in climate variability and change monitoring 13**
 - a. Countries development projects 13
 - b. Recommendations 13
- Bibliography 15**
- Annex 1: Time schedules of workshops 17**
- Annex 2: factsheets on data available, gaps and monitoring program for each country 18**
 - Annex 2.1 - Albania 19
 - Annex 2.2 - Montenegro 24
 - Annex 2.3 - Bosnia and Herzegovina 30
 - Annex 2.4 - Croatia 37
 - Annex 2.5 - Egypt 42
 - Annex 2.6 - Palestine 48
 - Annex 2.7 - Morocco 54
 - Annex 2.8 - Algeria 59
- Annex 3: Recaps of national workshops (see the annex report) 65**

Acronyms

ABHL	: Agence du Bassin Hydraulique du Loukkos (Hydrological Basin Agency of Loukkos, Morocco)
AVP	: Agencija za vodno područje Jadranskog mora (Agency of the Adriatic Sea watershed)
CLIMB	: Climate Induced Changes on the Hydrology of the Mediterranean Basins
DMN	: Direction Météorologique Nationale du Maroc (National Meteorological Ditection of Morocco)
DPDPM	: Direction des Ports et du Domaine Public Maritime (Direction of Ports and Maritime Public Domain of Morocco)
EU	: European Union
FHMI	: Federalni hidrometeorološki zavod BiH (Federal Hydrometeorological Institute of B&H)
FMAWMF	: Federal Minister of Agriculture, Water Management and Forestry
GEF	: Global Environment Facility
GIS	: Geographic Information System
HEIS	: Hydro-Engineering Institute of Sarajevo
HIS	: Hydrological Information System
HMI	: Hydrometeorological Institute of Montenegro
ICZM	: Integrated Coastal Zone Management
MCN	: Marégraphes Côtiers Numériques (Coastal Digital gauges)
MedICIP	: Mediterranean Integrated Climate Information Platform
PMD	: Palestinian Meteorological Department
UNEP	: United Nations Environment Programme
RCSN	: Regional Climate Services Network
RDBMS	: Relational Database Management System
UNDP	: United Nations Development Program
WMO	: World Meteorological Organization

Introduction

The Integrated Coastal Zone Management (ICZM) protocol¹ has been adopted in Barcelona on September 13th of 2010 and entered into force in March 2011 in order to tackle the problem of coastal degradation more effectively. It is the first legal instrument elaborated in the Mediterranean region about coastal protection. The Article 4.3(e) requests the Contracting Parties to promote the integrated management of the coastal zones, taking into account the protection of areas of ecological and landscape interest and the rational use of natural resources. Fifteen Mediterranean countries are parties of it². The project "Integration of climatic variability and change into national strategies to implement the ICZM protocol in the Mediterranean" fits into this framework.

In the coming decades, the Mediterranean basin area, due to its specific regional and local climate, is likely to face the impacts of global warming. Modifications in the environment such as sea level rise, changes in rainfalls or natural disasters might happen in the near future. It is possible to reduce the potential damages caused by these events by taking adaptation measures.

An integrated coastal management such as the one defined by the ICZM protocol requires the participation of all the affected stakeholders. Therefore the coastal area has to be managed beyond borders and sectors limitations to deal with the social, institutional, environmental and economical matters it faces. The Mediterranean coastal zone includes many countries; themselves containing many sectors involved with the coastal area and its management. Thus, the project "Integration of climate variability and change into national strategies to implement ICZM Protocol in the Mediterranean" has been initiated. This project is a complementary part of MedPartnership programme³ implemented in the Mediterranean region.

The overall project goal of the project is to promote the use of ICZM in the participating countries as an effective tool to deal with the impacts of climate variability and change in coastal zones by mainstreaming them into the ICZM process. Two specific objectives guide the work. The first one is to strengthen knowledge on regional climate variability and change and their impacts and define their specific characteristics in the Mediterranean region. The second one is to strengthen partnerships, improve capacity building and establish mechanisms for exchange of data and information for integration of climate variability and change into concrete ICZM policies, plans and programmes.

An essential step to allow such a management is to map and assess the existing national and regional databases and to propose a coordinating mechanism for accessing and sharing the relevant information between the stakeholders. The first component of the project is the "Development of regional climate variability monitoring programme", to be supported by a web-based regional data platform on climate research.

Plan Bleu has been responsible for the design and implement this platform that will allow all the participating countries of the project to exchange and share project experiences about their monitoring of climate variability and change: the MediCIP, which stands for "Mediterranean Integrated Climate Information Platform". The purpose of MediCIP is to "well 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

1 <http://www.pap-thecoastcentre.org/razno/PROTOCOL%20ENG%20IN%20FINAL%20FORMAT.pdf>

2 Albania, Algeria, Croatia, France, Greece, Israel, Italy, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia, EU

3 The Med Partnership - The Strategic Partnership for the Mediterranean Large Marine Ecosystem: <http://www.themedpartnership.org/>

and to enable potential users such as scientists, the civil society and policy makers to access these data". Therefore it should create a real emulation between the countries by gathering information on their indicators, practices and information related to climate parameters.

Eleven countries are participating to the ClimVar & ICZM project: Algeria, Albania, Bosnia and Herzegovina, Croatia, Egypt, Libya, Morocco, Montenegro, Tunisia, Syria and Palestine. The participation of each country to the design of such a platform is essential to its success. Hence, Plan Bleu has been mandated to organize with countries, national workshops to make an assessment of the data available and gaps for each of them, and integrate suggestions of the national stakeholders for discussing the possible design of the MedICIP. One of the main objectives of these workshops was to validate information and conclusions proposed in national reports drafted by national consultants in 2011, during the preparation phase of the project. Seven countries have hosted the national workshop in the time initially scheduled.

Two Plan Bleu's consultants, experts in the field of climate variability and change, Mr. Philippe Coste and Mr. Alexandre Borde from Carbonium in Paris (France), have moderated these workshops which led to a regional synthesis of the general knowledge, data available and gaps of the Mediterranean countries on climate variability and change. The experts benefited from the assistance of Ms. Esther Laske from Carbonium for the finalization of the present document. As a complement to the present synthesis, a report has been drafted after each workshop in order to keep their memory (agenda, list of participants, presentations doing) and to highlight main discussions and decisions. Thus, for a good overview and understanding of the work done in this component of the project, the present synthesis has to be considered with the specific factsheet for each country [Annex 2] (based on the national reports draft in 2011) and the national workshops' minutes [Annex 3].

I. Background, context and rationale for the development of a Regional Data sharing Platform for Mediterranean countries, sectors and stakeholders

a. Methodology of work

1. National reports and factsheets

The objective of the mission was the assessment of regional and national programs for monitoring and tracking climate variability and change and its impacts, including capacity assessments.

In each country, national reports on the monitoring stage of climate variability and change had been written. These reports had assessed the availability and gaps of the related national data, in the perspective of identifying the improvements to be made. They were produced by national consultants in 2010-2011.

Factsheets summarizing the outputs of the reports concerning the availability of the data on climate variability and change were prepared accordingly. This information is collected for the design of the MedICIP platform. Plan Bleu, in charge of the feeding of the web sharing platform, needed to consult the countries' stakeholders of the national coastal management. To facilitate the mobilization of the national stakeholders, the workshops were held in every country from April to November 2013 (Annex 1), with exception (at the end of 2013) of Tunisia, Croatia, Libya and Syria.

2. Objectives and process of the workshops

These workshops have been held in order to validate information and conclusions previously drafted in 2011 by national consultants and had three objectives for that purpose:

1. *Review of the 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 extraction and sharing options.
2. *Present the MedICIP Portal (content, objectives, modalities, users' needs)*
 - Present and discuss contents of the portal.
 - Analysis of users' needs and metadata: form (table, graph, and links towards reports...) and topic/sector (water, agriculture, tourism...).
3. *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?

The workshops started with a presentation of MedICIP made by the experts. They explained the regional context of its development, the aims of its implementation and the steps defined to complete it. The progress in the design of the platform was also detailed. National experts then presented the state of the knowledge in climate variability and change monitoring in the country, based on national report's conclusion. These presentations were followed by discussions and

exchanges about the possible indicators to share on the platform, the progress to be made and how to proceed.

These debates brought a meaningful contribution to the project by providing various points of view on the operation and expectations about the platform. As it is created for the national users, it is important that the platform meets their needs and concerns.

3. National reports and regional synthesis

After the moderation of the workshops, a large amount of data and information was available. It was important to give consistency and meanings to the knowledge that had been gathered, and to update the reports from 2010-2011.

The first step was the writing of a report based on the outputs of the workshops. National reports were written to present the feedbacks about the possible indicators and the design of the platform for each country. They provide a view of the progress of each country in climate variability and change monitoring. Bring together this information provides the keys for the design of the platform.

Finally a regional synthesis allows to have a larger overview of where the efforts still have to be made at the scale of the Mediterranean coastal zone, and a reflexion of the solutions to be found.

b. Content of the synthesis

Within the countries that participated in the national workshops, different institutional structures are displayed and thus the monitoring process is not similar from one country to another. It is important to analyze each national operation to be able to identify the data availability and gaps for the different systems met. All the information collected before, during and after the workshops will contribute to this task (some documents are still sent by some national authorities after the workshops).

This synthesis gathers and compares the information collected during the workshops concerning each country's procedure, in terms of:

Collection of data	Which institutions collect data?
Transmission of data	Through which networks: ministries, universities, private owners, conferences, reports of studies...
Updating of data	Which institutions are in charge? Which is the time scale considered?
Monitoring and control of the quality of data	Which experts? According to which process?
Population of indicators	Relevant (i.e. closely linked to the objectives to be reached/the policy), Accepted by staff and stakeholders, Credible for non experts and easy and unambiguous, Easy to monitor (e.g. does data collection possible at low cost?), Robust (e.g. against manipulation) ⁴ .
Existing communication about climate variability and change	From which institutions? On which topic? ...

From the details of these procedures, an abstract of the issues faced by the Governments and institutions responsible for climate variability and change monitoring has been made. Some

⁴ www.eipot.eu

recommendations, based on the workshops outputs, have been formulated concerning the improvement of these procedures.

II. State of the general knowledge of the countries of the Mediterranean basin linked to the climate variability and change

Most of participating countries are at different stages in the implementation of a comprehensive monitoring process for climate variability and change. Data they collect and indicators they use are very heterogeneous. It may be due to the number of projects implemented in countries and different funding which allow the collection of data or methodologies and tools to collect them, or just institutional differences such as development strategies and priorities. Some countries do not have any national climate change policy yet, the monitoring of climate data can be coordinated less efficiently then. However, the involvement of the participating countries shows a willingness to improve the existing systems, in order to better tackle the adaptation to climate change related to their coastal areas.

a. National data networks

Within countries, in most cases, several institutions (departments in ministries, national meteorological services, universities, private owners ...) are involved in data monitoring or analyzing. Therefore, for sake of efficiency, countries are aware that it's necessary to develop networks, in order to transmit and share the data and allow coordinating these stakeholders. Some of them have developed their own networks.

Networks related to meteorological data are present in every country with different degrees of sophistication. In a perspective of weather forecast, climate information are collected and transmitted through data networks. These networks involve the monitoring agencies, from the monitoring stations to the bureau storing and analyzing the data, and to all the entities the data are transmitted. These entities can be meteorological institutes or ministries.

Hydrological data and **marine data** are often dealt with through the same networks. In Albania, the main monitoring system established by the Ministry of Environment deals with the water resources, climate, air quality, vegetation, fauna census, etc. The operation is similar in Montenegro where the HMI collects hydrological, meteorological, oceanographic, air quality and water quality data from its official national networks. In Croatia, Meteorological and Hydrological services constitute one governmental entity.

Other types of networks related to data exist, for instance, in the case of Bosnia & Herzegovina, three networks have been presented: The energy community of the South East Europe Region; The Regional Cooperation Council, The Belgrade Climate Change Initiative. These networks are not especially focused on weather parameters but they share the information monitored regarding climate variability in the country.

Data related to networks are often developed through shared database. For example, Montenegro has the Oracle database which gathers hourly and daily monitored meteorological and hydrological data. Bosnia and Herzegovina is also developing an extensive geo-database: Historical and real-time information with respect to natural hazards will be gathered by satellite remote sensing, aerial

photographs and by other conventional means and integrated with GIS Relational Database Management System (RDBMS).

All these networks, if they allow to share precious information in terms of climate change, are rarely focused on this goal. **Climate variability and change related networks** are scarce, mainly because the monitoring of climate variability is still uncommon. Projects involving many stakeholders on the matter of climate variability and change are also likely to share data on the subject, and may be seen as networks of shared information. In that case, the example of the 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” involved sharing information between many stakeholders. However these contributions are punctual. They cannot replace actual data-related networks.

b. National monitoring programs

Meteorological monitoring of data is undertaken in all the participating countries. These monitoring programs involve meteorological stations spread across the country, more or less numerous. The tracking of weather parameters is then transmitted to agencies which will deal with the analysis of the data, for weather forecast matter principally. This type of procedures is mainly managed by institution, like the Institute of Energy, Water and Environment in Albania. Then all these data are often centralized by the ministry in charge of the environment or water. Research institutes are also involved in certain monitoring, as in Albania where research institutions of the Academy of Sciences had been merged to better monitor and study hydrological and climatologically aspects and cover research studies on biodiversity as well.

The monitoring related to climate change is not so developed. This could explain the lack of networks related to climate variability data. In Bosnia and Herzegovina, there is no comprehensive environmental monitoring and data collection system. It results in the lack of an information system for environmental protection.

Table 1. Institutions involved in data monitoring

	Croatia	Bosnia & Herzegovina	Montenegro	Albania	Morocco	Palestine	Egypt	Algeria
Meteorological	Meteorological and Hydrological Service of Croatia	Federalni hidrometeorološki zavod BiH Republički hidrometeorološki zavod RS	Hydro-meteorological Institute of Montenegro HMI	Institute of Energy, Water and Environment	DMN	PMD (Palestinian Meteorological Department)	Metrological Authority	Agence Spatiale Algérienne
Hydrological	Meteorological and Hydrological Service	Agencija za vodno područje Jadranskog mora (AVP) HEIS (The Hydro-Engineering Institute Sarajevo) FHMI (Federalni hidrometeorološki zavod BiH) Republički hidrometeorološki zavod RS	Hydro-meteorological Institute of Montenegro HMI	Institute of Energy, Water and Environment	ABHL	Ministry of Agriculture	Agricultural Researches Centre	Agence Nationale des Barrages et Transfert Agence Nationale des Ressources Hydriques Institut National des Sols de l'Irrigation et du Drainage
Marine	None	HEIS (Hydro-Engineering Institute Sarajevo) FMAWMF (Federal Minister of Agriculture, Water Management and Forestry)	Hydro-meteorological Institute of Montenegro HMI	NA	MCNs from the DPDPM	NA	EEAA (Central Department for the Integrated Management of Coastal zones and marine – Central Department Of Climate Change) General Authority for Fish Resources - Development General Authority of Shore Protection	Agence urbaine chargée de la Protection et de la Promotion du Littoral et des zones touristiques de la wilaya d'Alger Commissariat National du Littoral Ecole Nationale Supérieure des Sciences de la Mer et de l'Aménagement du Littoral Laboratoire d'Etudes Marines
Climate variability and change	Not mentioned	None	None	Not related to coastal area	None	NA	Egyptian Environmental Affairs Agency Central Department for Climate Change	Agence Nationale des Changements Climatiques Ministère de l'Aménagement du Territoire et de l'Environnement

As noticed previously, international projects contribute to the improvement of national monitoring. Some data have also been collected depending on development projects conducted in the countries. Thereby many UNDP projects focused on adaptation have allowed to gather information on climate variability and change. The intervention of international organizations participates to the improvement of the knowledge in this area. In Palestine, this is the case with the CLIMB project funded by the 7th Framework Program of the EU.

c. Climate variability and change data availability

Data availability depends on the efficiency of the monitoring and information dissemination. All the five countries concerned by this series of workshops have a correct meteorological monitoring and thus have all the necessary data regarding air temperature (all indexes - minimum, maximum, and mean); precipitation (daily, monthly, yearly amount, intensity for different time duration etc.); wind; sunshine radiation; humidity, etc. Hydrological data are also collected: mean daily water level, monthly and yearly mean, maximal and minimal water level, daily discharge and monthly and yearly mean, maximal and minimal discharge.

Oceanographic data are monitored as well in a certain number of countries. The data that can be found are: tide parameters, wind, water temperature and some chemical elements are measured.

Relevant information for the monitoring of climate variability and change is the record of the earlier data dating from the last decades. It allows to picture the evolution of the climate and its variability and changes throughout time. Most countries which are undertaking meteorological monitoring store these data. Though, a problem of data availability might be faced with their digitalization, needed for computer analysis. The meteorological archive of Albania for example consists of raw and ongoing processed data.

The data more specifically related to climate change are more difficult to find, and the coastal aspect also limits the number of data provided. A certain number of countries have not developed such data collection. For instance, Albania has not many studies and information concerning national marine and coastal areas affects from the climate change phenomenon.

But examples of improvements in this regard exist. Bosnia and Herzegovina conducts some measurements related to the climate variability and change: Green House Gas Reporting, Changes in surface and groundwater systems, flooding risks, droughts, fresh water quality; climate-related warming of lakes and rivers.

Another interesting dataset is the one regarding the social and economic impacts of climate variability. Montenegro and Morocco have started developing data related to the socio-economic impacts of climate variability and change.

III. Climate variability and change data gaps: lack and skills of the countries of the Mediterranean basin linked to the climate variability and change

There is a variation in the approach taken by each Mediterranean country in the monitoring of climate variability and change. There are different stages of progress in the implementation of an efficient and comprehensive monitoring system. Therefore it is important for the countries to exchange their experience in order to progress in the process. The discussions of the workshops with the national stakeholders have allowed to further identifying the gaps in climate variability and change monitoring.

a. Bottlenecks identified

Table 2. Depending on the cases, problems are faced at different stages of the process

At the monitoring stage	<p>The lack of core data is an important reason for gaps in tangible information about climate variability and change. This is related to:</p> <ul style="list-style-type: none"> ➤ Lack / improvement needed of infrastructure/ technical capacities; ➤ No digital database; ➤ Poor communication between the different institutions in charge for the monitoring.
Analysis of the data	<ul style="list-style-type: none"> ➤ Not oriented towards climate change; ➤ A lack of data and analysis to support decision-making and strategic planning in the sector ; ➤ It seems that very few have calculated socio-economic indicators or the cost of CV&C.
Identification of action and planning of policies	<p>One of the main problems faced with adaptation in the coastal zone is the multiplicity of institutions and agencies concerned. Coastal management deals with different sectors which fall under the governance of many institutions and agencies.</p> <p>It entails:</p> <ul style="list-style-type: none"> ➤ Lack of coordination at the national level and at the level of the Southeastern European region on research, planning, and management; ➤ 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; ➤ The example of Bosnia and Herzegovina illustrate very well this issue of coordination, as the country has a very complex governance, with numerous ministries, which makes the process more complicated.
Communication	<ul style="list-style-type: none"> ➤ No state body in charge of systematically providing information. It is noticeable in Bosnia where it is probably related to the complexity of the Bosnian institutions; ➤ Low public awareness and economic constraints in industry and households limit the capacity of those potentially affected by climate threats to undertake autonomous adaptation measures; ➤ Low awareness of the affected stakeholders.
Cross-cutting issues	<ul style="list-style-type: none"> ➤ For some countries, funding is insufficient to develop adequate adaptation policy or merely improve the monitoring system. In Albania for instance, most of the funding is provided by international donors and the governmental budget allocated to climate variability and change is modest, ➤ At every stage of the process, there is a lack of qualified staff.

b. Data still to be developed

Besides the technical or institutional lacks that may be responsible for certain gaps in data availability, some indicators or studies are not developed yet because the process of climate variability and change monitoring is not sufficiently advanced. This suggests that, once the identified bottlenecks will be overcome, the national stakeholders will move forward in the process and be able to populate indicators and produce all the necessary knowledge.

Table 3. Experts in countries point out that some indicators and analyses remain to be developed such as:

Priority level	Data to be developed
High priority	Further identification of coastal zones at risk, regarding climate variability and change impacts and production of climate change risk maps.
	Documentation of impacts already occurring in return to climate trends.
	Comprehensive assessment of adaptation options available, including the modifications needed to existing conservation planning and practice (in situ and ex-situ conservation).
Medium priority	Assessment of the changes of the coastal line and the effect of river basin in this phenomenon.
	Analysis of the species, habitats and ecosystems most vulnerable to climate changes.
	Understanding of factors determining the resilience and adaptive capacity of ecosystems, including the roles of habitat extent, connectivity and quality, flow regimes, and disturbances.
Low priority	Development of socio-economic scenarios needed which could allow analyses of present and future social and economic costs of climate change impacts.

c. Specificity and disparity between the countries

The participating countries have national specificities related either to their involvement in international plan or organization, their geographical location or their national development.

The EU members countries with Mediterranean coastal zones are similarly committed through a platform called Climate-Adapt5. They have been already supported within the European Union framework to tackle the adaptation to climate change issue. Thereby they benefit from the instruments already implemented by the EU agencies. For instance, the Corine Land database which display the land use of all the European countries.

The membership to the World Meteorological Organization (WMO) also provides some advantages, mainly because it helps the member countries to improve their weather monitoring system. Albania, Croatia and Montenegro belong to this organization.

The development stage of country is an important point as well. The budget allocated to the monitoring will condition its efficiency and its capabilities of improvement. Countries not having modern weather stations to monitor the data or digital database have a longer way to go. Thus it is important to bear in mind that, unlike the countries of the North Mediterranean coast, the South Mediterranean countries belong to the mid or low income countries.

Palestine is a particular case because of its political situation. Even though a National committee for climate change has been created, its actions and above all the data on which they could elaborate them are limited by the political situation. Furthermore one significant drawback for Palestine is not Contracting Parties member of the Barcelona Convention, and Protocols, including the ICZM Protocol⁶.

⁵ <http://climate-adapt.eea.europa.eu>

⁶ http://www.pap-thecoastcentre.org/about.php?blob_id=56&lang=en#ratification

IV. Development perspectives in climate variability and change monitoring

a. Countries development projects

Even though gaps in data monitoring have been identified, national institutions are working hard to develop and improve the information collection and the communication networks.

The countries have set short-term goals and improvement strategies. Here are below some examples.

First, as far as Albania is concerned, it has been highlighted that the establishment of a government unit inside the Ministry with the staff of the institutions is very necessary at the moment;

Then, regarding Bosnia and Herzegovina, the country is developing a new database historical and real-time information with respect to natural hazards will be gathered by satellite remote sensing, aerial photographs and by other conventional means and integrated with GIS Relational Database Management System (RDBMS). This results in an extensive geo-database. One proposed measure to address shortcomings in current knowledge regarding the impacts of climate change on the water sector is the development of a Hydrological Information System (HIS).

As far as Palestine is concerned, Palestine developed a Climate Change Adaptation Strategy and Programme of Action for the Palestinian Authority through technical assistance from United Nations Development Programme, Programme of Assistance to the Palestinian People, 2010. Also Palestine had participated with r Mediterranean countries in Climate Induced Changes on the Hydrology of Mediterranean Basin, Reducing Uncertainty and Quantifying Risk through an Integrated Monitoring and Modelling System. Currently EQA is hosting ongoing study on Assessing National Capacities of Palestinian Institutions to mainstream the Climate Change and implement adaptation/mitigation measures and develop short and long-term needs for capacity development of PA institutions regarding CC adaptation/mitigation

Finally, regarding Montenegro, the country hosts the project within the “Adricosm-Star” initiative⁷ 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.

The development of MedICIP will be an efficient tool for the countries to progress in their approach. Through the web sharing platform they will be trained to management themselves their data in for a common using; they will be able to learn from each other systems or innovation. Hence the involved countries will work for the elaboration of efficient and practical adaptation policies for the protection of the Mediterranean coastal area.

b. Recommendations

All the MedICIP countries are willing to improve in climate variability and change monitoring and to collaborate to the platform. The seven national workshops confirmed the determination of the national stakeholders and decision makers to take the measures for monitoring climate variability and change first, in order to be able to better adapt to climate change. Moreover, the professional involved in the countries of the Mediterranean basin are fully open to the exchange of data with

⁷ <http://adricosm.biokotor.me/>

each other. It is a very positive point to note that no political matter comes to slow the sharing process. In this perspective, MedICIP is off to a good start.

Beyond the developments presented in the previous section, and taking into account the bottleneck identified, the following recommendations have been formulated. They are the results of the discussions during the workshops.

- Research programs on monitoring climate related data should be encouraged in Universities in view of building a bridge between science and policy-making.
- Even though the ICZM protocol is the basis for thinking, the issue of better delimit the coastal zone considered in the project arose. It is a point to clarify to go further in the process;
- The lack of qualified staff at every stage of the monitoring and analysis of data is an issue commonly raised. Training of officials and institutional capacity building are essential for the efficiency of monitoring mechanisms;
- Institutional obstacles to the elaboration and implementation of adaptation policies should be fully addressed. The various relevant departments, authorities and agencies need to share information and collaborate more effectively;
- It is important to move ahead with the regional restitution workshop in order to keep the momentum after the national workshops which took place in most of the countries. There is a high expectation from the participants to the workshops to move ahead.

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- Pandžić, Krešo (2011). *Report on National Experience in Dealing with Climate Variability and Change Issues*. Croatia, Meteorological and Hydrological Service.
- Ivanov Mirjana and Luka Mitrović, (2013). *“Presentation on Hydrometeorological and hydrographic monitoring on the coastal area of Montenegro”*.
- Knežević, Jelena (2012). *Presentation on Program “integralnog upravljanja obalnim područjem Crne Gore”*.
- Snoussi, Maria (2011). *Regional experience on assessing Impacts of climate variability and change in the Mediterranean area (GEF eligible countries)*. UNEP/MAP.
- UN Economic Commission for Europe (2011). *Environmental Performance Reviews, Bosnia and Herzegovina, Second Review*.
- UNDP, Programme of Assistance to the Palestinian People (2010). *Climate Change Adaptation Strategy and Programme of Action for the Palestinian Authority*.
- Zuna, Violeta (2013). *Presentation on Contribution of UNDP on the Improvement of the Coverage and Management of Marine and Coastal Protected Areas*.

Annex 1: Time schedules of workshops

April 2013		
Tuesday	02/04/13	Albania
Wednesday	03/04/13	
Thursday	04/04/13	
Wednesday	10/04/13	Montenegro
Thursday	11/04/13	
Friday	12/04/13	
Monday	22/04/13	Bosnia and Herzegovina
Tuesday	23/04/13	
Wednesday	24/04/13	

May 2013		
Monday	20/05/13	Egypt (Discussion with the CEO of the EEAA in Cairo)
Monday	27/05/13	Morocco
Tuesday	28/05/13	Palestine
Wednesday	29/05/13	

October 2013		
Wednesday	23/10/13	Egypt
Thursday	24/10/13	

November 2013		
Monday	18/11/13	Algeria
Tuesday	19/11/13	

Annex 2: factsheets on data available, gaps and monitoring program for each country

- Annex 2.1 - Albania
- Annex 2.2 - Montenegro
- Annex 2.3 - Bosnia and Herzegovina
- Annex 2.4 - Croatia
- Annex 2.5 - Egypt
- Annex 2.6 - Palestine
- Annex 2.7 - Morocco
- Annex 2.8 - Algeria

Annex 2.1 - Albania

Background

The level of education for climate change is low even for environmental education in general.

Operation

The Ministry of Environment, Forest and Water Administration (MEFWA), collects necessary data from different research institutes and line ministries. The REAs supervise and apply preliminary environmental licensing, and collect and process the data on the environmental situation at municipal and prefecture level.

Data available

- Ministry of environment centralized most of those data are dealing with the water resources (quality and quantity), climate, air quality, vegetation, fauna census. Updating: every year.
- The Institute of Energy, Water and Environment (IEWE) controls the actions of data transmission from stations to the collection and processing centre in Tirana.
- All the hydro meteorological information is sent to the Institute after processing is archived (paper, ongoing digitalization).
- The data collecting, especially for the surface water and soil, are interpreted in relation to the climate change effects.
- The Climate Change programme is currently producing an inventory of Green House Gases, an analysis of preventive measures to curb emissions, and an assessment of the potential impact of Climate Change on selected areas.
- The most important role, especially in using the meteorological data in the weather forecast is the way of transmission of the meteorological data from stations to the center.
- The meteorological archive consists of raw and processed data of air temperature (all indexes - minimum, maximum, and mean); precipitation (daily, monthly, yearly amount, intensity for different time duration etc.); wind; sunshine radiation; humidity, etc. The hydrological data archived are the mean daily water level, monthly and yearly mean, maximal and minimal water level, daily discharge and monthly and yearly mean, maximal and minimal discharge.

Data gaps / Other lack / Needs

- The objective of the National Capacity Self Assessment was to assess capacity needs and priorities.
- No comprehensive national policy to address climate changes has been adopted to date.
- There are not many studies and information concerning national marine and coastal areas affects from the climate change phenomena.
- The lack of identified sites with impacts already occurring in return to climate trends, understanding the factors determining the resilience and adaptive capacity of ecosystems, assessing the changes of the coastal line and the effect of river basin in this phenomena,

comprehensive assessment of adaptation options available, including the modifications needed to existing conservation planning and practice, analyses of present and future social and economic costs of climate change impacts,

- No specific law for the climate change had been approved.
- No any monitoring to the climate change effects on coastal area is present.
- Until 2005, in some stations transmission was made by phone on daily basis for data of the extreme temperatures and precipitation and monthly data monitored from all stations reach the center one month later by mail; there are good reason to believe that after 2005 there is a kind of stuck process for data collection and elaboration. This procedure is not available and effective for weather and extreme event predictions, and especially for prediction of river discharge and warning of the agriculture land inundation.
- No digital database, data are stored in the paper format and only a part of it is in the electronic format. The process of data archiving needs a lot of time due to the lack of the network system computers. All these data are stored in the paper format and only a part of it is in the electronic format. Nowadays they are under the digitizing process.
- Lack of financial support, no special funds for staff training even if WMO provides to members a variety training programs.
- There are not many efforts and studies concerning national marine and coastal areas affect from the climate change phenomena, so that the main problems are the lack of:
 - Documentation of impacts already occurring in return to climate trends;
 - Understanding of factors determining the resilience and adaptive capacity of ecosystems, including the roles of habitat extent, connectivity and quality, flow regimes, and disturbances;
 - Assess the changes of the coastal line and the effect of river basin in this phenomena;
 - Analyses of the species, habitats and ecosystems most vulnerable to climate changes;
 - Comprehensive assessment of adaptation options available, including the modifications needed to existing conservation planning and practice (in situ and ex-situ conservation);
 - Analyses of present and future social and economic costs of climate change impacts.

Strengths

- Mitigation and adaptation measures are addressing through NCCAP (National Climate Change Action Plan), which consists of a set of priorities for action to integrate the climate change concerns into other economic development plans.
- Several strategies and plans are developed and adopted, like the revised NEAP, Energy Strategy, Strategy of Forestry Development, Urban Waste Management Plan, Strategy of Agriculture, National Action Plan for Health and Environment, Growth and Poverty Reduction Strategy, Biodiversity Strategy, Water Strategy.

Monitoring program

Institution. After September 2007 the research institutions of the Academy of Sciences were merged with the University department creating biggest centres of research inside the Universities as part of a new institutional reform taken by the government.

Topic. Hydrological and climatologically aspects and few research studies with biodiversity (flora and fauna).

Institution. Institute of Energy, Water and Environment (IEWE) as part of the Polytechnic University of Tirana (the previous Hydro Meteorological Institute-HMI, the National Agency of Environment and Forest (including the previous Research Institute of Forest and Pastures and Institute of Environment) depending from the Ministry of Environment, Public Health Institute, the Centre of Study for Flora and Fauna.

Topic. Dealing with climate change research.

- The monitoring program for environmental is supported by the Ministry of Environment (publication of the State of Environment) and the existing network of the research institutions. There are also several surveys or studies in certain areas from different project that can be used as a basis for data collection in time and spatial manner.
- The main institution in Albania dealing with the monitoring of climate and the variability is the Institute of Energy, Water and Environment (IEWE), part of the Polytechnic University of Tirana, which inherited all the capacities and network of the previous Hydro-Meteorological Institute.
- Albania is member of World Meteorological Organization (WMO).

Network

Meteorological: Monitoring of meteorological elements in Albania in all the territory, 126 meteorological stations.

Hydrological: National Hydrological Network (NHN), consists of 103 stations, from which 92 in rivers, springs and channels, 6 stations in seacoast and lagoons and 5 in lakes. The main parameters monitored are: (i) water level by the staff gauges or automatic recording system (15 analogue water level recorders, 5 electronic level recorders and 2 D.C.P), (ii) river discharge by the method of flow velocities, using the current meters.

Marine: monitoring network, tide parameters, wind, water temperature and some chemical elements are measured. Currently, no recorder devices exist.

List of institutions

1. *Ministry of Environment, Forest and Water Administration*
2. *Ministry of Agriculture, Food and Consumer Protection*
3. *Ministry of Public Work and Transportation*
4. *Ministry of Tourism, Culture, Youth and Sport*
5. *Albanian Geological Survey Institute*
6. *Institute of Nature Conservation in Albania*
7. *The National Association of Communal Forest and Pastures*

Vulnerable zones

- Coastal zone and the most vulnerable sectors are water resources, agriculture energy and tourism, forest, health

- These concerns from climate change are expected to influence directly in 10 protected areas, but the most problematic zones near the seashore regarding the erosion and climate vulnerability are:
 - Zhuporo (Vlore).
 - Lalzi (Durrës).
 - Patok Beach.
 - Velipoje.
 - Karpen (Kavajë).
 - The delta of Hoxhara Chanel (Vjose-Seman).
- Regarding physical impact: decrease in precipitation, annual increase in temperature, Sea level rise and coastal flooding, destruction of hydro regimes in the lagoon, damage and fragmentation of habitats, increasing the activity of coastal erosion, introduction of salt water on agricultural land, groundwater pollution, increased stress on flora and fauna, changes in total water amount and levels, but also erosion of riverbeds, and modification of turbidity and sediment load.
- The diagnosis seems to be established and some scenario has to be build until the horizon 2050/2100

Scenario

- The expected Climate Change Scenario for Albania (CCSA), including seasonal and annual changes scenarios, leads to an annual increase in temperature up to 1°C, 1.8°C, 3.6°C respectively by 2025, 2050 and 2100 and a decrease in precipitation up to - 3.8%, -6.1%, - 12.5% by the same time horizons.
- In the previous studies the assessment of vulnerabilities is focused on the assessment of the expected climate impacts in hydrosphere, natural and managed ecosystems, energy, tourism, public health, population.

Other element:

The Integrated Coastal Zone Management for the Southern coast of Albania (WB project) was another attempt to include the climate change effect in the coastal zone development issues. But the project did have some serious problem in the implementation and did not reach it expected results.

Link towards all the literature

International documents

- *Impact of climate change on biodiversity in the Mediterranean Sea*, UNEP/MAP – RAC/SPA 2008;
- *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007, The Physical Science Basis - Summary for Policymakers*, Intergovernmental Panel On Climate Change;
- *Synthesis Report, Climate Change 2007, Intergovernmental Panel On Climate Change*;
- *Climate Change and vulnerability of the Bern Convention Species and Habitats*, 2nd Meeting of the Group of Experts on Biodiversity and Climate Change, Council of Europe;

- *Climatic change and the conservation of European biodiversity: Towards the development of adaptation strategies*, Standing Committee of Bern Convention, Council of Europe;
- *Climate change impacts in the Mediterranean resulting from a 2°C global temperature rise*, A Report for WWF 2005;
- *Global change ecology*, William H. Schlesinger, TRENDS in Ecology and Evolution Vol.21 No.6 June 2006;
- *Biological invasions as a component of global change in stressed marine ecosystems*, Marine Pollution Bulletin 46 (2003) 542–551.

National documents

- *Albanian Coastal Zone Diagnosis Analysis Report, Expert report 2005*;
- *Synthesis Report on stocktaking of climate change activities carried out in Albania up to 2004, UNDP-GEF Climate Change Program- Albania*;
- *The First National Communication of the Republic of Albania to the United Nations Framework Convention on Climate Change (UNFCCC), Ministry of Environment 2002*;
- *Albania's Technology Needs Assessment, UNDP & MEFWAFWA, 2005*;
- *State of Environment report, 1999-2006*;
- *Southern Coastal Development Plan - Strategic Environmental Assessment, Ministry of Public Works, Transport and Telecommunication, COWI 2007*;
- *National Energy Strategy, Final Draft 2008*;
- *The Second National Communication of the Republic of Albania to the United Nations Framework Convention on Climate Change (UNFCCC), Ministry of Environment, Forest and Water Administration 2009*
- *Albanian national overview on vulnerability and impacts of Climate Change on Marine and coastal biodiversity*;
- *Albania National Capacity Self Assessment for Global Environmental Management (GEF/UNDP), 2006*

Other documents identified

- *Conserving European Biodiversity in the context of Climate Change*, Committee for the activities of the Council of Europe in the field of biological and landscape diversity, 2005;
- *Integration of Biodiversity Concerns in Climate Change Mitigation Activities*, A Toolkit, Institute for Biodiversity Network (IBN) & The Association of Engineers (VDI).
- *Towards a Strategic Framework on Climate Change and Development for the World Bank Group*, Concept Issue Paper, February 2008
- *WB report on Adapting to Climate Change in Europe and Central Asia*, June 2009.

Project

- *Identification of adaptation response measures in the Drini - Mati River Deltas (May 2008 - May 2012)*

Annex 2.2 - Montenegro

Background

The Ministry of Physical Planning and Environmental Protection realises 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 have⁸:
 - 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 Tourism,
 - The Ministry of Agriculture, Forest and Water Economy.
- It is very important to point out several role of Hydro meteorological 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

⁸ Please, check the new names of aforementioned Ministries.

- **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°C) 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.
- 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 realisation.

List of institutions

- Hydrometeorological Institute 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).

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 SECCFAP-A

Annex 2.3 - Bosnia and Herzegovina

Background

- The BH coastal area cannot be analyzed isolated without considering plans and proposal from the neighboring countries (Federation of BiH, Republic of Srpska and Republic of Croatia and Montenegro). Neretva and Trebišnjica Rivers are fundamental resources for Bosnia and Herzegovina, and are very important for Croatia and Montenegro too.
- B&H has very limited adaptive capacity to address climate risks. Complicated governance structures, a lack of key strategic documents and supporting regulations, limited human resource capacity, and financial constraints lead to very limited capacity to respond to climate threats and adapt to climate change in a systematic, integrated way; i.e., through proactive adaptation measures. At the same time, low public awareness and economic constraints in industry and households limit the capacity of those potentially affected by climate threats to undertake autonomous adaptation measures.
- By the adoption of entity Laws on Environmental Protection (2002/2003), BiH created conditions in which it could begin organized activities in the area of education and awareness-raising, which were to have been gradually implemented through institutional strengthening, inter-sectoral cooperation, and a supportive regulatory framework. On the whole, it may be concluded that until now all these activities have not been well organized, and that the results have been modest.
- Knowledge and awareness of climate change in BiH is not sufficient so currently operational programs to inform the public are under preparation.

Operation (it's also a policy constraint)

- The only state-level ministry that has responsibility for environmental issues – Ministry of Foreign Trade and Economic Relations of BiH (MoFTER) – only deals with selected aspects of environmental issues, primarily those related to international relations.
- BiH does not have the organized system of scientific research so no monitoring of environmental impacts is available.

Data available

- A section on GHG Reporting along with BiH Air EIS questionnaires and the Review of the Air Emissions Information System were developed during the EU CARDS-funded “Support to Air Monitoring” project. BiH EIS questionnaires, along with the additional pollutant release and transfer register (PRTR) reporting questionnaire, should cover all the needs for collecting data for GHG emission calculations in line with the European guidelines.
- A study should cover all hydrological stations in BiH in operation during a reference period (1960 - 1991 as a minimum), and after the war. Updating existing knowledge of the water regime in BiH is very important, including applied research on as-yet-unknown hydrological relationships. Especially interesting aspects for consideration are: Changes in surface and groundwater systems / Floods / Droughts / Water quality; climate-related warming of lakes and riv.

- The maximum, minimum and average values of monthly precipitation, for two periods of 26 years: 1956-1981 and 1982-2007 (for the non continental part).
- Different sea-level trends: from a rise between +0.53 and +0.96 mm/y to a decrease between -0.50 and -0.82 mm/y, a range mainly due to local tectonic activity (Barić et al, 2008).
- The Ministry of Environment and Tourism of FBiH, supporting a project of consulting companies and non-governmental organizations, has financed the formation of a climate change web portal⁹. The portal was made by the Regional Centre for Education and Information on Sustainable Development in South-eastern Europe (REIC). This portal will be used to disseminate an electronic newsletter about climate change, which will be sent to subscribers, and to provide information to those offering services in the areas of mitigation and adaptation in BiH (and later in South-eastern Europe as a whole), such as consulting services in research, production, and engineering.
- Primary adaptation measures and secondary adaptation measures are identified for the following fields: nature and environment, nature as resource, use of space, socio-economic development. (Coming from the establishment of work groups findings provided regarding the vulnerability and adaptation from the INC, where a division into four groups has been made).
- Is a model currently under development? (The attempt by meteorologists to predict the state of the atmosphere).
- A similar model already exists in Novi Sad developed by the Centre for meteorology and environmental predictions - Department of Physics Faculty of Science at the University of Novi Sad (Serbia). Because of the very small area it would be unreasonable and inappropriate to make a model for weather forecasting just for the BH coast. In this scenario the whole east Adriatic coast of Croatia and even the Montenegro's coast should be considered
- Under development: Historical and real-time information with respect to natural hazards will be gathered by satellite remote sensing, aerial photographs and by other conventional means and integrated with GIS Relational Database Management System (RDBMS). This results in an extensive geo-database.
- Through specific model and GIS Relational Database Management System¹⁰ (RDBMS) the assessment of natural hazard vulnerability could be generated for BiH and Croatian coastal zone.

Data gaps / Needs

- It should be particularly pointed out here that there is a need to further modernize the network by the introduction of Automatic Weather Stations and their connection into a system of automatic monitoring together with hydrological stations, particularly with the purpose of automatic monitoring and software control of the situation at river basins, as well

⁹ A national climate web portal would contain: Data and prognoses of climate change in BiH / Vulnerability assessment of BiH, vulnerable natural resources, as well as projected impacts on living conditions, all in relation to climate change, /Programs of adaptation to climate changes in BiH and in the world, / and Information on incentive mechanisms for implementation of mitigation measures (local and international).

¹⁰ Which allows an evaluation of the likelihood of experiencing specific natural hazard.

as for planning water consumption for the needs of electricity supply, water supply, agriculture, other activities, and the population.

- No comprehensive environmental monitoring and data collection system, which results in the lack of an information system for environmental protection.
- Different data are gathered by various institutions without coordination and in the absence of a unified database.
- No exchange of data and communication between the institutions gathering data and higher governmental agencies, nor is there information about existing data.
- A lack of data and analysis to support decision-making and strategic planning in the sector (climate change impacts and water). The existing water management infrastructure is inadequate, and a lack of coordination at the national level and at the level of the Southeastern European region on research, planning, and management.
- Does not have the management, technological and economic capabilities to adapt to climate changes.
- Lack of financial funds, very few activities are directed on flood prevention.
- Institutional Constraints: understaffing in environmental agencies remains a serious obstacle to fulfilment of the obligations of BiH considering the implementation of requirements under UNFCCC.
- Statistics are incomplete and are compiled at the entity level.
- The sectors which have priority policy and activity needs are¹¹
- No state body in charge of systematically providing information

Specific need

- It is particularly important to inform the business community about climate change issues. This community needs two types of information:
 - Information on the extent to which conditions in the business environment have changed and may change in the future (e.g., changes in precipitation that are significant for agriculture and hydropower); and
 - Information on new technologies (the application of these technologies will not mitigate climate change in BiH, but their application will improve socio-economic development according to the principles of sustainable development).

Strengths

- One proposed measure to address shortcomings in current knowledge regarding the impacts of climate change on the water sector is the development of a Hydrological Information System (HIS). The HIS is not simply a database or archive, although it incorporates an archive. It is a logical and structured system to collect data that are subsequently entered into the

¹¹State development policy; biodiversity and environmental protection; protected areas and the most vulnerable ecosystems; energy policy; environmental policy; forest management policy; technology development; energy; hydrology and water resources; industry; transport; waste management; agriculture; the service sector; public health; and socio-economic development.

computer, checked and stored and where data may also be compared, associated, related and combined to provide information in a format suitable for users.

Monitoring program / national plans and programs for monitoring

- The modernization or establishment of a total of seven Class 1 weather stations in RS (Republic of Srpska) and further modernization of the 13 professional weather stations in FBiH (Federation of Bosnia and Herzegovina). It is also necessary to establish a professional weather station in Brčko District. There is also a need to introduce Automatic Weather Stations connect them with hydrological stations, particularly with the purpose of automatic monitoring and software control of the situation at river basins, as well as for planning water consumption for the needs of electricity supply, water supply, agriculture, other activities, and the population.
- To support and strengthen already implemented project, here a proposals for the full-size project given:
 - First proposal: Wrk with Ministries On Climate Change – WOMOCC
 - Second proposal: DEvelopment of an mathematical MOdel for Weather forecast – DEMOW
 - Third proposal: DEtailed Vulnerability ASsessment study with a GIS database - DEVAS

Network / transboundary / regional networks and structures

- The energy community of the SEE Region;
- The Regional Cooperation Council
- The Belgrade Climate Change Initiative.

List of institutions

- Several institutions in BiH are dealing with flood prevention.
- In this area the Agency for the water area of Adriatic Sea and Agency for river basin of River Trebisnjica have in their activities also some flood prevention programs and plans.
- The Tourist Association of BiH
- Ministry of Foreign Trade and Economic Relations B&H
- PAP/RAC National focal point: Hydro-Engineering Institute of Civil Engineering Faculty in Sarajevo
- Ministry of Security B&H : is providing assistance after floods, for flood prevention there are no financial funds.
- Ministry of Agriculture, Water Management and Forestry of Federation B&H
- Ministry of Environment and Tourism of Federation B&H

Vulnerable zones

- Decrease of snowfall is especially characteristic, which will affect the water supply of underground aquifers. Lack of water will affect agriculture, hydro, population, water management.

Key Sector	Vulnerability	Primary adaptation measures	Secondary adaptation measures
Coastal area	Erosion risk and soil deficiency due to sea level rise Increase in water temperature	Inclusion in the coastal zones management programmes of the Republic of Croatia	Reduction in anthropogenic impacts on the coastal and sea areas.
Water management	Changes in seasonal river flows Decrease in the quantity of water flow in rivers Difficulties in water supply for households and industry	Construction dams and accumulation reservoirs for hydropower generation, agriculture, drinking water, tourism, fish-farming, etc.	Training on the efficient use of water and reduction of losses in distribution Strengthening the system of water quantity monitoring and forecasting; Development of a Hydrological Information System

Impacts

- Rivers in the Dinara catchment basin will be greatly affected, particularly the Neretva and Trebišnjica Rivers due to SLR.
- One of the main problems, due to the increase of precipitation, for the coastal zone are floods and soil erosion. The Ministry of Security is dealing with those issues.

Scenario

- The scenario developed in the framework of the UNEP Programme on Climate Change in the Mediterranean Region (1990-1996) showed the most probable rise in the average sea level as 65+35 cm (REC, ECNC, 2008).

Link towards all the literature

International documents

- PAP/RAC. 2007. Protocol on Integrated Coastal Zone Management in the Mediterranean

Internet web sites are dealing with climate change and variability

- Ministry of Physical Planning, Civil Engineering and Ecology of Republic Srpska - <http://www.unfccc.ba>
- Regional Education and Information Centre for Sustainable Development in SEE (REIC) - <http://www.klimatske-promjene.ba>
- <http://siteresources.worldbank.org/EXTMETAP/Resources/CZMP-Bosnia.pdf.pdf>

National documents

- Initial National Communication of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (Ministry of Physical Planning, Civil Engineering and Ecology of Republic Srpska, October 2009)
- National Report on current Policy, Procedures, Legal Basis and Practice of Marine Spatial Planning in Bosnia and Herzegovina (PAP/RAC 2007)
- Fifth National Communication of the Republic of Croatia under the United Nation Framework Convention on the Climate Change (Ministry of Environmental Protection, Physical Planning and Construction, January 2010).

Annex 2.4 - Croatia

Background

- The public is very concerned about the environment and climate change.
- A lot of climate information is produced.

Data available

General statement

- More than 100 hydrological, 30 phenological and 5 marine stations for sea-level including about 30 sea surface temperature gauges in Croatian coastal area. 117 climatological (C), 336 precipitation (P) and 23 rain storage stations. Automated weather stations (AMS) are co-located at 32 main meteorological station sites, and 26 AMS are installed at other locations. Standard measurement time resolution for AMS is 10 minutes with the same potential of transmission.
- Terrestrial observations (such are: soil temperature, soil moisture, pan evaporation, and solar radiation measurements) are co-located at 19 Main Meteorological Stations. Croatia takes care for the two radio-sounding systems in Zagreb and Zadar, 2 Doppler S band plus 6 small S band weather radars and one sodar.
- Average distance between the main meteorological stations is about 50 km, between climatological stations about 20 km and between precipitation stations about 10 km.
- Data are mostly available in Meteorological and Hydrological Service of Croatia and some of them, since 1980 all, are available in electronic ASCII format.
- Due to the availability of climatological secular time series, the longest for Zagreb-Gric starts 1861, there is a good basis for climate monitoring in Croatia.
- More than 30 time series start since at least 1961

Evaporation

- Annual potential evaporation (in millimetres) for Zagreb-Gric weather station for the period 1862-2008.
- Summer (JJA) potential evaporation (in millimetres) for Zagreb-Gric weather station for the period 1862-2008.
- Calculated annual run-off (in millimetres) for Zagreb-Gric weather station for the period 1862-2008.
- Calculated average annual soil moisture (in millimetres) for Zagreb-Gric weather station for the period 1862-2008

Precipitation

- Spatial distribution of mean annual precipitation in Croatia, 1961-1990
- Annual precipitation amounts for Zagreb-Gric weather station for the period 1862-2008.
- Winter (DJF) precipitation amounts for Zagreb-Gric weather station for the period 1862-2008

- Summer (JJA) precipitation amounts for Zagreb-Gric weather station for the period 1862-2008.
- Autocorrelation functions for 24-year precipitation amount moving averages for Croatia and for the period 1951-2000
- Twenty-five year precipitation amount moving averages for Parg and Zavižan, indicated with number for the period 1951-2000
- Data on Water resources and also for the follow-up of water level for lakes and also the river flow.

Temperature

- Average annual air temperature (°C) for the period 1961-1990
- Annual mean of daily mean air temperature for Zagreb-Gric weather station for the period 1862-2008.
- Winter season (DJF) mean of daily mean air temperature for Zagreb-Gric weather station for the period 1862-2008.
- Summer season (JJA) mean of daily mean air temperature for Zagreb-Gric weather station for the period 1862-2008.
- Two-metre-height air temperature 25-year moving average anomalies for 24 weather
- Stations, including coastal, for the territory of Croatia and for the period 1951-2000

Sea level rise

- December-January-February (DJF) sea levels recorded at various Adriatic stations and used to obtain a time series, also shown, which is deemed representative of the region.
- Five-year running means of the DJF sea levels representing the five regions considered. Bidecadal signal is pronounced in the Adriatic and Aegean Seas since the beginning of 1970s

Pheno-phases

- Time series of the pheno-phases of common lilac, apple and olive trees, the 5-year moving average series and linear trends for Rab and Hvar mainly for the period 1961–2008

Needs

- Categories of weather stations: poor for altitude 600-1000 m and above 1600m.

Strengths

- Various legislations exist in Croatia related to climate variability and change issue.
- Croatia actively participates in World Meteorological Organization (WMO) programmes on climate variability and change and its technical commissions (continuous maintenance of climate monitoring, the interpretation of global climate model scenarios and their downscaling on an up to date level. Climate information distribution system development for the users).
- A proactive role of Croatia in international natural Disaster Risk Reduction (DRR) programmes in South-Eastern Europe (positive feedback in the climate change adaptation policy and implementation measures to reduced damages from extreme weather and climate events as well as in risk assessment and vulnerability including Adriatic coastal region).

Monitoring program / national plans and programs for monitoring

- A typical example of regional cooperation has been developed within “Drought Management Centre for South Eastern Europe” led by the Agency for Environment from Slovenia. This international project has a clear strategy for implementation represented within corresponding EU Commission project. The project is also related to the “National Action Programme to Mitigate the Effects of Drought and Combat Land Degradation” (2007) by the Croatian Ministry of Environmental Protection and Physical Planning.

List of institutions *dealing with climate variability and change*

- Meteorological and Hydrological Service (DHMZ), Zagreb, (www.mete.hr)
- Andrija Mohorovicic Geophysical Institute, Zagreb, (www.gfz.hr)
- Institute of Oceanography and Fisheries, Split, (www.izor.hr)
- Hydrographic Institute, Split, (www.hhi.hr)
- Centre for Marine Research, Rovinj, (www.rovinj.hr)
- Institute of Geology, Zagreb, (www.hgi-cgs.hr)
- Faculty of Civil Engineering – University of Split, Split, (www.gradst.hr)
- Faculty of Philosophy – Sociology Department, Zagreb
- Institute for Adriatic Culture and Melioration, Split, (www.krs.hr)
- State Directorate for the Protection of Cultural and Natural Heritage, Zagreb

- Ministry of Environmental Protection and Physical Planning (MZOPUG), Zagreb, (www.mzopu.hr)
- Agency for Environment, Zagreb (www.azo.hr)
- The "Climatic Research Unit of the University of East Anglia"
- Meteorological and Hydrological Service, Croatian Hydrographic Institute and Croatian Waters are prevailing operational governmental institutions with great experience with climate and climate related monitoring and forecasting of state atmosphere and sea or land waters, respectively. Institute for Oceanography and Fisheries and Centre for Marine Research also have experience in monitoring of physical, chemical and biological aspects of sea stage.

Vulnerable zones and economic sectors

- Fragile agriculture and forestry with their social and economic significance. There is also the potential influence on hydrology, water resources, mainland and coastal ecosystems.
- Agriculture, fisheries, health, hydropower, tourism and the coastal zone - the sectors have been analyzed - represent 25% of the Croatian economy, employ almost half the working population and represent a total annual Gross Domestic Product (GDP) of 9 billion Euro.
- To improve the existing sea level monitoring system on the Croatian coast and also necessary to organize observation of the sea level impact on erosion, groundwater and fresh surface water in selected locations, primarily in the areas of both Vransko lakes (at Cres and Zadar respectively), in the Neretva River valley and at the town of Nin area.
- The alluvial plain of the Neretva River, and Vrana Lake on the island of Cres.
- Vulnerable zone due to SLR: probably the most endangered coastal resources are freshwater areas and wetlands in the table below:

Cities	Rivers	Lakes	Other places
- Nin	- the Raša	- Vransko lake on the island of Cres	-western Istrian coast
- Zadar	- the Cetina	- Vransko lake near Biograd	-the island of Krpanj
- area of Šibenik	- the Krka		
- Split	- the Zrmanja		
- Stari Grad on the island of Hvar	- the Neretva		
- Dubrovnik			

Impacts

- Sea level rise and : E.g. rise in the water table, increased ground water salinity, more frequent sea flooding, intrusion of saline water into estuaries of coastal rivers would have negative impacts on coastal services and infrastructure, with associated maintenance costs, as well as causing accelerated deterioration of valuable historic buildings.

Scenario

- The time horizons considered are: 2030, 2050 and 2100 regarding 2 studies: "Implications of expected climatic changes for Kaštela Bay Region of Croatia" and "Implications of expected climatic changes for the Cres-Lošinj Islands".

- 2 scenarios: Impact of sea level increase at 50 and 88 cm (MZOPUG, 2010). The 50 cm increase represents high rise considering a potential sea level increase mentioned in the IPCC report, while the 88 cm increase represents the maximum projected increase in the case that there is not any significant melting of the Greenland and the Antarctic ice cover.

Link towards all the literature

International documents

- "A climate for change – climate change and its impact on society and economy in Croatia" (2008) has been issued by United Nation Development Programme (UNDP)
- "Adapting to coastal climate change - a guide book for development planners" (2009) published by "USAID from the American People" seems to be a very good guide for the development planners including legislation and policy levels.
- The "Climate atlas of Croatia" (2008) by the Meteorological and Hydrological Service should be mentioned in which climate conditions for the 1961-1990 reference period are described in detail.

National documents

- Five National Communication of the Republic of Croatia under the United Nation Framework Convention on the Climate Change (2000-2010) edited by Ministry of Environmental Protection and Physical Planning of Croatia describes the new stage of climate change matters in Croatia.
- "Adapting to Climate Change in Europe and Central Asia", World Bank (2009) represents good basis for making a road map for planning adaptation measure to climate changes in coastal region of Croatia partly based on the paper by Barić et al. (2008).
- Jeftić et al. (1992) and (1996): "Implications of expected climatic changes for Kaštela Bay Region of Croatia" and "Implications of expected climatic changes for the Cres-Lošinj Islands".
- Croatian Environmental agency (<http://www.azo.hr/Database01>)
- Spatial Planning Agency (<http://zlatkohorvat.com/croatian-spatial-data/> and <http://zlatkohorvat.com/>)
- State Institute for nature protection (<http://www.dzzp.hr/eng/>)

Annex 2.5 - Egypt

Background

- One of the Mediterranean country the most sensitive to climate variability and change impacts regarding population, water supply and sea level rise.

Operation of studies

- Egyptian government, the governorate of Alexandria
- The Egyptian Environmental Affairs Agency and the Ministry of State for Environmental Affairs invested together with bilateral and multilateral assistance agencies contribution, close to 24 billion US\$ in environmental management and protection activities (*World Bank, 2005*).

Data available

- Several general analyses of the potential impact of sea level rise on the Nile Delta coast have been carried out (*e.g. Sestini, 1989; El-Raey, 1993; El-Raey et al 1995; CRI and Delft 1993; Stanley et al. 1993*).
- A contour map of the Nile Delta demonstrating most vulnerable coastal areas of the Nile delta region in Egypt to potential impacts of sea level rise is available.
- Estimation of the socio-economic impact due to loss of land and jobs is possible using employment statistics relevant to each sector and taking future growth rates into consideration.
- The systematic monitoring systems and data basis available for climate change and/or ICZM is very limited so far. These include:
 - Data from the Egyptian Meteorological organization
 - Satellite images from NARSS
 - Tide gauges data as collected by the ports and by the Coastal research institute
 - Collected data by the Ministry of State of Environmental Affairs
 - Collected systematic observations carried out by EEAA/EIMP programs for monitoring of Air pollutants (CO₂, and particulates levels), and Coastal and marine pollution monitoring along the Mediterranean and the Red Sea coastal zone. These data are quality assured and quality controlled and continues for over 14 years now.
 - It has been collected by the Institute of Graduate studies and Research (IGSR) of university of Alexandria for the Mediterranean coast and the National Institute of Oceanography and fisheries (NIOF) for the Red Sea coasts.
 - Data collected by projects on Natural Protectorates concerning wetlands, water quality.
- The only available QA/QC (Quality Assurance/Quality Control)¹² systems available are the EIMP program and at EEAA site. These programs involve coastal pollution monitoring and Air

¹² Quality Control or QC is a system of routine technical activities implemented by the inventory development team to measure and control the quality of the inventory as it is being compiled. QC procedures include technical reviews, accuracy checks, and the use of approved standardized procedures for emissions calculations. Quality Assurance or QA is a system of external review and audit procedures conducted by personnel not involved in the inventory development process. QA is an independent, objective review by a third party to

pollution program. Except for the data available at the EEAA information system EEAA/EIMP over the past 14 years, the author does not know of any QA/QC program.

- Tide gauges data may be available at the Coastal Research Institute (CoRI) of the Ministry of Water Resources. Some oceanographic data may also be available at the National Institute of Oceanography and Fisheries (NIOF).
- Coastal monitoring stations along the Mediterranean and Red Seas.
- Distribution of meteorological stations of Egypt (El Karfous, 2008).
- Some of the sites of tide gauges available in Egypt along the Mediterranean.
- Time series variation of aerosol optical depth over the Nile delta cities indicating Khamasin large peak (April-May) and the black cloud of smaller peak on October of each year.

Data gaps

Only few capacities in order to follow coastal erosion, excessive industrial and domestic pollution and salt-water intrusion

The lack of awareness of stakeholders has made sustainable development of the region under prevailing conditions practically impossible.

Needs

- Shortage of institutional monitoring, assessment and feedback systems
- Shortage of awareness and access to technology
- Except for the World Bank Report (Das Gupta et al, 2009) no detailed assessment of the vulnerability of the coastal zones or inland areas to this impact is available for Egypt, nor is there any reliable model for prediction.
- So far, there is limited institutional capability for data verification, dissemination and analysis.
- The techniques and methodologies for vulnerability assessment of Egypt's coastal zones are reasonably well identified (e.g. IPCC methodology based on remote sensing and GIS). Although a quantitative pilot study has been carried out for one or more of the vulnerable areas (e.g. Alexandria governorate, Port Said,.....), current data on land use and elevation are needed before reaching a final overall assessment of the potential impacts of climate change on the coastal zones of the country.
- A program based on a strategic policy for costal protection and adaptation must be advanced and implemented.

Strengths related to ICZM

- 1994: Establishment of the National Committee for Integrated Coastal Zone Management (NCICZM).

assess the effectiveness of the QC program and the quality, completeness, accuracy, precision, and representativeness of the inventory.
<http://www.epa.gov/apti/course419a/docs/lesson5.pdf>

- 1996: Development of the "framework Programme for the Development of National ICZM Plan for Egypt.
- 1996: Preparation of Guidelines on EIA Procedures.
- 1996: Preparation of Environmental Guidelines for the Development of Coastal Areas.
- 2002: Developing the 2nd National Environmental Action Plan.
- 2007: Re-establishment and restarting of the national committee for ICZM.
- 2009: Amendment to the Law for the Environment No 4 to integrate the ICZM Protocol within law No 9 via an article on ICZM.
- A National Committee for ICZM was established, however ineffective, and a national strategy is being formulated.
- A suggested ICZM strategy as of 2003.
- A Coastal Area Management Program (CAMP) supported by the Mediterranean Action Plan was developed in Fuka - Matruh in the mid-1990s.

Monitoring program / national plans and programs for monitoring

- Related to SLR: El Raey et al, 1995, 1997, 1999, 2004, 2006a and 2006b.
- P19 Table (1): Investments by the Egyptian Environmental Affairs Agency including bilateral and multilateral assistance agencies contributions.
- P 20, 21, 22. Table (2): A list of some of the projects carried out and in progress on climate Change in Egypt.

List of institutions dealing with climate variability and change & ICZM

- The institutional organizations responsible for ICZM are:
 - National Committee of ICZM
 - Egyptian Environmental Affairs Agency (EEAA), Environmental Management Sector.
 - NC ICZM Technical Secretariat, General Department
 - Mediterranean Coastal Department
 - Ministry of state for environmental affairs: (iczm department and climate change department – water quality department - protectorates Department)
 - EEAA branches (3 branches in the med. Region)
 - Ministry of agriculture and land reclamation
 - Ministry of irrigation and water resources
 - Ministry of marine transportation
 - Ministry of tourism
 - The coastal governorates
- List of institutions dealing with climate variability and change issues:
 - University of Alexandria, Institute of Graduate Studies and Research (IGSR)
 - University of Alexandria, Climate Change Center and Risk Reduction (CCRR)

- Institute of Coastal Research, Alexandria (CoRI)
- University of Cairo: Faculty of Urban Planning
- University of Cairo: Faculty of Science: Department of Astronomy and Meteorology.
- Ministry of Water Resources: Climate Change Institute,
- Ministry of Agriculture: Agriculture Research Center / Agriculture Meteorology Center / Soil and Water Research Center.
- Ministry of Scientific Research (NARSS): National Authority for Remote Sensing and Space Sciences,
- Ministry of Scientific Research: National Institute of Astronomy and Geophysics
- Center for Environment and Development for the Arab Region and Europe (CEDARE)

Vulnerable zones

- Serious coastal erosion along the Mediterranean coast are noted: loss of sand dunes, salt marches and wetland.
- The coastal area of the Nile Delta due to: its low elevation and high vulnerability to sea level rise and land subsidence / salt water intrusion and land subsidence and groundwater salinization on the coastal zone
- Several areas have been identified (e.g. El Raey et al, 1992, 1995, 1997, 2006a and b)
 - Coastal cities of Alexandria, Port Said, Rosetta, Marina, Matruh and Arish due to potential impacts of sea level rise
 - South of Abo Qir bay
 - Brullus village
 - Red Sea: Sharm and Hurghada cities
 - Arish City

Vulnerable sectors

- The demand for water in Egypt is dominated by three major user groups: agricultural irrigation, domestic use and industry.

Impacts of CVC

- *The following impacts on water resources in the Nile river basin are expected:*
 - Continuation of temperature increases losses by evaporation and demands for water for agricultural domestic and industrial applications increase.
 - Change of precipitation patterns will lead to a loss of water in coastal areas if proper catchments are not available. It is depend on two factors, namely variation of the general cycle of the wind, El-Nino and ENSO phenomena.
 - Increases in airborne dust levels, soil salinity and domestic use decreases water quality.
 - Sea level rise will increase occurrence of salt water intrusion with contamination of groundwater resources in the coastal zone.
 - A detailed quantitative assessment of the impacts of climate change on water resources in Egypt has yet to be produced.

- Impacts resulting from changes in the precipitation pattern, shortages of fresh water resources, loss of already scarce vegetation cover, increased desertification and associated socio-economic impacts, have yet to be studied in depth.
- The following climate changes impacts on agriculture are expected:
- Increase of severity and frequency of extreme events will reduce crop yield (some crops are more tolerant than others).
 - Change of average temperature will induce changes of the agricultural distribution of crops.
 - Increase of temperature will negatively affect marginal land and force farmers to abandon marginal land.
 - Shortage of water resources will also force farmers to abandon marginal land, and increase desertification.
 - Socio-economic impacts associated with loss of jobs, such as increase of unemployment, loss of income and political unrest.
 - An assessment of the impacts of climate change on some crops has been advanced (e.g. Eid et al, 1993). However, a detailed quantitative assessment of the impact of climate change on the agricultural sector has not been carried out yet.
- The following climate changes impacts on coastal zone are expected:
- The coastal zone of Egypt is seriously vulnerable to the effects of sea level rise and changes in weather patterns from both the physical and the socio-economic points of view.
 - Large areas of the governorates of Alexandria, Behaira, Kafr El-Shiekh, Port Said, Damietta and Suez, are particularly vulnerable to sea level rise. Other vulnerable areas include Lake Bardawil, coast of Obeyedh near Matruh and the coasts of the Bitter lakes. Many other areas on the Red Sea are also vulnerable.
 - The coastal zones as a whole are also particularly vulnerable to changes in precipitation, excessive frequency of storm surges and changes in the heat pattern through the impacts of floods.
 - The impacts of accelerated sea level rise (ASLR) through direct inundation, salt water intrusion, deterioration of ecological systems and associated socio-economic consequences, have been addressed.
- Socio-Economic Impact on Coastal Settlements
- Inundation and salt water intrusion will affect the management and access to agricultural sites; reduce tourism, and result in socio-economic impacts on the inhabitants of these areas which compel a significant proportion of the coastal zone population to abandon their land and homes.
 - Changes in the ecological system of lakes will reduce fish catches and drive away a large portion of fishermen and their dependents.
 - Loss of beaches will reduce the number of tourists in coastal areas, forcing tourism dependent individuals and communities to abandon their settlements and look for jobs elsewhere thus Tourism will be affected.

- Increased water logging and salinity give rise to insect and pest problems which in turn causes health problems.
- Increases in temperature lead to increased soil erosion and dust. Increased dust has direct adverse impacts on health, installations and equipment. Increased wind speed encourages sand dune movements and threatens coastal infrastructure.
- Increased humidity and temperature decrease the human comfort zone, and reduce human productivity.
- Increased unemployment induces political and civil unrest.
- Sea level rise will increase the risk of submerging low elevation coasts
- Salinity of the ground water table and thus decrease in crops productivity
- Change in the crop yields, agricultural economics and water resources
- Less in the biodiversity and species extinction and aquatic plants that are sensitive to salinity

Scenario

- A scenario of sea level rise (SLR) of 0.5m, 1.0m, and 2.0m, over the next century was assumed.

Annex 2.6 - Palestine

Background

In trying to govern a society facing the many major challenges that come with life under occupation, dealing with the seemingly nebulous concept of climate change is not the Palestinian National Authority's (PNA) number one priority. Nonetheless it is becoming increasingly clear to many at the government level that climate change poses some serious threats to an already tense Palestinian existence.

The concept of climate change has emerged in the most recent Palestinian Reform and Development Plan (PRDP), which outlines the government's key budgetary priorities for the 2008-2010 timeframe and Environmental sector strategy 2011-2013.

Operation

The National Committee for Climate Change is the appropriate Palestinian strategic body to take lead responsibility for developing policies and measures relating to drought minimization and management. This body needs to be actively supported by a technical committee comprising relevant Palestinian institutions (especially the Palestinian Water Authority, the Ministry of Agriculture, and the Environment Quality Authority (EQA))

Data available

- The Palestinian Ministry of Transportation had twelve partially functioning metrological stations in Gaza which had data on daily-base on temperature, rainfall precipitation, and humidity and wind speed. The data are available from 1973 to 2010 and was collected from the Ministry of transportation.
- Financial PNA's administrative and financial capacities.
- Spatial variation of annual rainfall over the twelve climatic stations in Gaza Strip (1980-2010).
- Precipitation rates 1980-2010.
- The Mean Monthly Areal Rainfall (MMAR) time series, (Thiessen Method) from (1980 - 2010).
- Average rainy days in Gaza strip (1980-2010)

Data gaps / Other lack / Needs

- Due to the limitations of the PNA's administrative capabilities, the implementation of climate change adaptation strategy is difficult.
- No data available on sea level rise.
- None of the models (see scenario part below) takes into account socio-economic impacts particular to the oPt, which suggests the need for a regional downscaling model tailored to address Palestinian adaptation priorities in the face of future climate risks.
- Strengthening the national institution specialized in climate variability and change especially in monitoring, research and modelling and also strengthening the capacity for climate change monitoring in terms of legislation, institutions, and facilities

- Also there is a need to strengthening the capacity, for monitoring climate change impacts in terms of legislation, institutions and facilities. In addition to technical assistance is needed for modelling (running scenarios/models) of climate change impacts is also required.
- Technical assistant in developing the legislation concerning mainstreaming climate variability and change adaptation into national policies, plans, regulations and programs.
- Establishing of a regional data bank on climate variability and change, and impacts within UNEP. It is worth to establish a “clearinghouse” mechanism for the exchange information on adaptation to climate change.

Strengths

- The cabinet is formed national committee on climate change led by EQA also the Environment Quality Authority (EQA) appoint also “Advisor for Climate change” for EQA chairman.
- The Environment Quality Authority participated in the Council of Arab Ministers Responsible for the Environment in its 19th session at the headquarters of the Secretariat of the League of the Arab States on December 2007. The council has adopted the Arab Ministerial Declaration on climate change, which constitutes the base for future action and reflects the Arab position in dealing with climate change issues.
- As a public-private initiative, Climate SMART addresses mitigation and adaptation opportunities from a cost-benefit perspective, with special consideration given to the long-term sustainability of the measures to be implemented. The plan encompasses all of HRM's corporate and community assets and activities, and includes a series of tools that are used to incorporate climate change information into its municipal decision-making processes. Climate SMART was formally launched in March, 2004 and includes several key deliverables.
- The Palestinian Environment Quality Authority (EQA) is in the process of generating an action plan for the national climate change adaptation strategy.
- COMET (Community, Energy, and Technology in the Middle East) are already poised to help assist in the more widespread use of solar panels and wind turbines.
- The Palestinian Energy Authority (PEA), in conjunction with Palestinian Energy and Environment Research Center (PEC), has formulated a 5-year national master plan for developing renewable energy resources and increasing energy efficiency in Palestine.
- A drought early-warning system for the oPt (occupied Palestinian Territory) is already under development, supported by Italian Development Cooperation. This will improve data collection on rainfall and soil moisture, providing a more scientific basis for minimizing the risk of drought and desertification (UNDP/PAPP, 2009).

Monitoring program / national plans and programs for monitoring

- The Palestinian Ministry of Environmental Affairs, now EQA, had prepared the “Gaza Coastal and Marine Environmental Protection and Management Plan” in 2001.
- The Palestinian Environmental sector strategy 2011-2013, National strategy to combat desertification.

- A coastal and marine action plan :
- The development of a coastal and marine protection committee, which includes representatives of the key stakeholders in the coastal and marine zone.
- The preparation of a balanced set of coastal and marine protection measures that are in line with the Palestinian Environmental Strategy (MENA, 2001).
- In 2009, the Environment Quality Authority (EQA), is spearheading the effort to generate a climate change risk and vulnerability assessment report/adaptation strategy for Palestine, entitled "Climate Change Adaptation Strategy for the Occupied Palestinian Territory" and funded by the United Nations Development Program's (UNDP) Program of Assistance to the Palestinian People (PAPP).
- New project under preparation: signed May 2013 "Enhancing the Capacities of the PA in Mainstreaming Environment and Climate Change in oPt". The objectives of the project are:
 - To support the PA preparedness, especially MENA, and the Ministry of Foreign Affairs to engage in the International Environmental Conventions, including United Nations Framework Convention for Climate Change (UNFCCC) and Rio Convention in preparation for the state building;
 - Mainstream Climate Change into national plans and strategies as integral component for sustainable development and green economy;
 - Assess and strengthen the capacities of the related PA ministries and authorities in CC mainstreaming, adaptation and mitigation according to the priorities identified;
 - Implement selected Pilot projects (from the PAPA) in the most affected areas in oPt including water resources and food security, efficient and sustainable use of energy and sea level rise;
 - Enable the PA to access environmental financing with focus on the GEF/SGP.
- Many Palestinian NGOs had benefited from the GEF-SGP funds in order to implement small-scale projects at the local and national levels in the fields of climates changes adaptations aiming at effective management of groundwater, wastewater, storm water, solid waste, air quality, land use, energy and seawater.

Network / transboundary / regional networks and structures

Multilateral Projects

- In 2010 the Islamic University in Gaza is one of the partners and one of the selected study sites in the multilateral project called "Climate Induced Changes on the Hydrology of Mediterranean Basins (CLIMB) – Reducing Uncertainty and Quantifying Risk through an Integrated Monitoring and Modeling System" (www.climb-fp7.eu/). This project (January 2010 - end of 2013) funded by the European Commission through the Seventh Framework Program. The main objective of this project is to analysis the climate change impacts on available water resources.
- CLIMB aims to develop innovative tools for assessing the risks and vulnerability of water resources as a result of climate change. It developed viable modelling and monitoring systems for the hydrological cycle in the Mediterranean region which are capable to

providing rapid analyses of significant changes (droughts, floods, salinization of coastal aquifers, soil degradation...), possible sources of tension and conflict between political and economic actors.

- CLIMB developed innovative tools and methods which, while reducing uncertainties in analyses of climate change, will permit the introduction of adaptation strategies for sustainable management of water resources.
- The project will establish supervisory networks for the resource and carry out field studies (collection of data on geophysical elements, monitoring of water and vegetation dynamics, analysis of socio-economic factors, etc.). High resolution space detection techniques (remote sensing data for Gaza) helped in evaluation of various useful parameters for modelling (mainly land use land cover). Integrated innovative approaches (improvement of current algorithms, models for risks, etc.) will be used.
- The Climate change, hydro-conflicts and human security (CLICO) project (<http://www.clico.org>) is a collaborative project funded under the EU Framework 7 Program which will explore the ways in which different hydro-climatic, climate change, water conflict and human security as well as climate change and its social dimensions.
- The Arab Climate Resilience Initiative (ACRI) is a UNDP program that aims to address the challenges of climate change by connecting stakeholders in the Arab States to innovative knowledge, partnerships and solutions. (www.arabclimateinitiative.org).
- Clima South project that funded by EU.

List of institutions

Local Non-Governmental Organizations	Academic Institutions	Palestinian Governmental Institutions
<ul style="list-style-type: none"> • Palestinian Hydrology Group (PHG) • Palestinian Environmental Friends (PEF) • Applied Research Institute of Jerusalem (ARIJ) • Palestinian Union of Agriculture Work Committees UAWC • MA'AN Development Center 	<ul style="list-style-type: none"> • Birziet University • Al-Najah University • Hebron University • Islamic University • Al-Azher University • Al-Aqsa University 	<ul style="list-style-type: none"> • Environmental Quality Authority • Ministry for Local Government • Ministry of Planning • Ministry of Agriculture • Palestinian Water Authority • Ministry of Transportation – Metrological Stations • Coastal Municipal Water Utility in Gaza • Palestinian Energy Authority and Natural Resources • Ministry of health

Vulnerable zones

- Three of the most vulnerable areas of Palestinian society: the Bedouin communities around Hebron, Jordan Valley villages and residents of the Gaza Strip.

Vulnerable sectors

- The potential impact on already scarce and politicized water resources of CC.
- Relationship between climate change and water scarcity and the consequent impacts on agriculture.

- The annual decrease in precipitation has led to less freshwater availability and agricultural land (Increases in seasonal temperature variability, storminess and frequency of temperature extremes may endanger cold- and heat-sensitive crops. (Also drought and floods).
- Impacts on trade: A delayed growing season would cause Palestinian agricultural sector to lose its advantage over countries in colder climates as an early exporter of flowers, fruits and vegetables (Palestinian Ministry of Agriculture 2008).

Impacts

- Water
 - Increased water shortages from lower rainfall and higher evaporation
 - Increased storm water flooding from greater rainfall variability
 - Insufficient rain to recharge aquifers
 - Deterioration of surface and groundwater quality.
 - Shift of rainy season
- Agriculture
 - More frequent droughts and increased desertification.
 - Changes in economic viability of crops (e.g. shorter growing seasons)
 - Increased crop water requirements
 - Decline in grazing ranges and stocks
 - Higher food prices.
 - Shift of rainy season
 - Decrease in % of marketable crops
 - Reduction of production percentage per area
 - Increase of agricultural pests
- Energy
 - Increased energy and fuel demands to cope with more temperature extremes
- Public health
 - Increase of diseases in public health ailments related to the lack of water such as diarrhoea, cholera and dehydration.
 - Increased heat stress from high temperature extreme events.
 - Spatial and temporal alteration of disease vectors, including malaria,
 - Leishmaniasis, and tick-borne diseases.
- Coastal management
 - Salt water intrusion into the Coastal Aquifer.
 - Land use impacts from sea-level rise and coastal erosion.
 - Soil degradation.
 - Loss of biodiversity

Scenario

- The climate projections derived from high-resolution climate models applied to the eastern Mediterranean region also differ in some key respects from the lower resolution IPCC forecasts.
- **The Japanese Meteorological Agency Atmosphere General Circulation Model (JMA-AGCM)** with 20km grid squares. This climate model was run for the eastern Mediterranean according to three time-slices – present climate (1982-1993) and then two future runs (2080-2099) with moderate and high climate sensitivity. The future climate change scenarios were based on IPCC emissions scenario A1B.
- **The GLOWA-Jordan River RCM**, which uses an American nonhydrostatic meteorological model. The meteorological fields generated have also been coupled with a hydrological model **WaSiM** to provide the first estimates of hydrological responses of the Upper Jordan River to forecasted climate change.
- **The Sea Atmosphere Mediterranean Model (SAMM)**, which combines the French AGCM ARPEGE-Climate Model of 50 km² resolution with a regional Ocean General Circulation Model (OGCM) with 10km grid squares. Climate simulations for the Mediterranean were run from 1960-2100 using observed values up to 2000.

Link towards all the literature

National documents

- Climate Change Adaptation Strategy for the occupied Palestinian territory prepared by EQA and UNDP on 2009.
- Palestinian Climate Change Policy prepared by Friend of the Earth on 2010.
- Climate Change Impacts in the Arab Region.
- Gaza Coastal and Marine Environmental Protection and Management Action Plan prepared by Palestinian Ministry of Environment on 2001.
- MENA, 2001. Gaza Coastal and Marine Environmental Protection and Management 53Plan. MENA Publications, Gaza, Palestine. Available at www.environment.gov.ps/upload_file/1947601254208422.doc
- Palestinian National Authority (PNA). 2008. Palestinian Reform and Development Plan 2008 -2010. Retrieved from http://www.mop-gov.ps/web_files/issue_s_file/PRDP-en.pdf

Annex 2.7 - Morocco

Background

Presentation of the National report in the framework of a consultation workshop organized by the Department of the Environment on the 25 February 2011.

Operators

- The Agency for the Promotion and Development of the Northern Provinces is the institutional organization whose territorial jurisdiction covers all the Central and Western Mediterranean coastal zones. The APDN aims to define and to realize social and economic development programmes in the Northern Provinces.
- The Development Agency for East Morocco is the institutional organization whose territorial jurisdiction covers all the Eastern Mediterranean coastal zones.

Available data

- The National Directorate of Meteorology has synoptic weather stations in the following cities: Tangiers/Tetouan/Nador/Al Hoceima/Oujda. The measured parameters include all the atmospheric parameters of a synoptic nature, especially rainfalls, temperatures, relative humidity, wind, solar radiation and atmospheric pressure.
- The Directorate of the Ports and the maritime public domain, under the responsibility of the Ministry of Infrastructure currently disposes of a network of digital coastal gauges that are installed in the ports of Nador and Tangiers.
- In addition to this equipment, there is also :
 - 1 operational digital coastal gauge of the ANCFCC (Conservation Foncière du Cadastre et de la Cartographie) in the Al Hoceima port
 - 1 gauge managed by the National Direction of Meteorology in the port of Tangiers
- There is currently no information on the means used to measure the waves in the Mediterranean coast, except for a marine buoy located in the port of Tangiers
- The Loukkos and Moulouya hydrological basin Agencies have observation and measuring (both quantitative and qualitative) networks of water resources which have fluctuating purposes and structures, but they all work in providing the information needed to the hydrologic activity.
- Flood warning posts are generally located upstream of the slopes; climate stations and rainfall posts; main hydrological stations on waterways; hydrological stations on dams; secondary hydrological stations; periodic gauging points on wadis, springs and seguias; piezometers for the monitoring of groundwater in the basin.
- The water quality monitoring network for the basin that includes: surface waters tracking points, groundwater tracking points, and dammed water tracking points, spring water tracking points.
- Morocco has a climate database that is managed and maintained by DMN. However, times series have a relatively short duration and seldom cover period of time before the 1960s.

- Basin Agencies also possess a hydrologic database (BADRE 21) that store series of debit and of groundwater piezometers' levels.

Unavailable data / others inefficiencies / needs

- Coverage of climate variability within sectoral policies remains highly focused on water and agriculture areas.
- In the Agriculture sector, measures are in general still at the academic and research step (most of it carried out by INRA). The Green Morocco Plan starts also some measures that are related to Climate change adaptation, but without clearly displaying the issue of these Climate changes as a priority.
- Coverage of climate changes and climate variability in the coastal zones management is still in the exploratory stage through some studies carried out.
 - Projects are seldom made in continuity and capitalization logic. Coordination remains relatively low between the different programmes carried out by several funders (World Bank, UNDP, FAO, bilateral cooperations, etc.);
 - Institutional compartmentalisation hinders the notification of results of some projects managed by different executing agencies;
 - Low level of sensibilisation of some stakeholders, particularly institutional stakeholders, for projects that are not considered a priority;
- Existing follow-up programmes are generally programmes that were developed independently from one another and that are intended to meet the corresponding sectoral needs. None of these programmes' objective was the monitoring of climate changes.
- Tidal data are, by contrast, at an early and disseminated stage.
- Information sharing remains difficult, either between the different Training and Research and Assimilated Structures Institutes or within each of them.
- Needs and capacity building related to ICZM, specifically in modelling for general atmosphere and sea circulations (swell, waves, river mouth). And for modelling risks in coastal zones and coastal aquifers.

Strengths

- Morocco signed the United Nations Framework Convention on Climate Change (UNFCCC) during the UNCED of Rio de Janeiro in June 1992. It was ratified by Morocco on 28 December 1995.
- On November 2001, Morocco submitted its Initial National Communication ((INC) on the water resources and agriculture themes to the UNFCCC.
- Climate projection modelling, application of output from a number of general circulation models (GCMs) and use of the SDSM downscaling model for Souss Massa region;
- Training on the water resources assessment model "WEAP";
- Several workshops on information and awareness raising, etc.

- In the **Water sector**, Morocco established since 1996 the High Council for Water and Climate (CSEC); this Council is charged with formulating the general direction of the national water and climate policy and with the exploration of the national strategy on climate knowledge, as well as its impact on water resources, the National Master Plan and the Integrated Water resources management plans.
- **Climate Change consideration** in the water sector is reflected in the National Water Strategy (2010-2030) launched in 2009 by the Water department of the Water and Environment Secretariat of State. The National Water Strategy also outlined the actions against floods and droughts as a priority.
- In the fields of **Forests and Biodiversity**, it has been noted the implementation of the National Plan of Action for Desertification Control, which was adopted in 2001 over 20 years. An early warning system on droughts was implemented by the High Commission for Waters and Forests and the Fight against Desertification.
- **Sectoral strategies convergence.** The strategies and plans adopted by the public authority reflect the national priorities. Feedbacks from regional debates initiated less than a year ago in the framework of the consultation on the National Environment and Sustainable Development Charter helped to outline different priorities depending on the regions considered.

Monitoring programmes / National plans and programmes

- Socioeconomic diagnostic of 6 SIBE (Sites d'Intérêts Biologique et Ecologique) under the MedWetCoast Programme; this programme is jointly managed by the Environment Departments and the High Commission for Waters and Forests for the conception of these sites' development plans (May 2003).
- Coastal planning programme in the Moroccan part of the Mediterranean; Feasability and Diagnostic study (Ministry of Environment, 2004).
- UNEP Project "Assessment of impact and adaptation to climate change in Moroccan coastal zones" (2004-2005)
- Capacity-building in some METAP countries for assessing the cost of environmental degradation in coastal zones (June 2006).
- The ACCMA project - Adaptation to Climate Change in Morocco, which is a project on adapting to sea level rise and extreme weather events in the eastern Mediterranean coast (2007-2010)
- Study on the impact of Climate change on agricultural sector in Morocco. World Bank & FAO (2008-2010)
- Vulnerability study to Climate change and natural disasters of North Africa coastal cities (2010- in progress)
- UNDP project: Adaptation to Climate Change in Morocco: Making oases resilient (October 2009-December 2011)
- Nature conservation and action against desertification (PRONA-LCD) – (2006-2008)

Networks/ networks and national structures / cross-border actions

- Partners organizations identified for support in preparing and managing large scale ICZM projects are the following:

Institutional and public level

- At central level : Departments of (i) the Environment, (ii) the Interior and (iii) of the Physical planning;
- At regional level:
 - The two development agency, namely: (i) the Agency for the Promotion and Development of the Northern Provinces and (ii) Development Agency for East Morocco.
 - Both these agencies will have technical support on some sectoral aspects by:
 - The Loukkos and Moulouya hydrological basin Agencies as regards water theme;
 - The urban agencies of Tangiers, Tetouan, Nador, Al Hoceima and Oujda as regards urban planning theme;
 - Regional services of involved ministerial departments: equipment, health, tourism, etc.
- At local level: concerned urban or rural communities, supported by NGOs that must be identified, particularly those locally counted by Tanmia and the association leader: Association Tetouan Smir in Tetouan, Association Angad in Oujda and Association Al Boughaz in Tangiers.

Scientific and technical level

- Involvement of training and research institutes in order to achieve a better adoption of the project pedagogically. Key roles of the Abdelmalek Saadi and Mohammed 1st Universities and involvement of some prestigious National Engineering Schools as centres for excellence in some specific professional groups (marine hydraulics, meteorology, land-use planning, infrastructures, sanitation, rural and agricultural development, etc.).

List of institutions

- High Council for Water and Climate (CSEC).
- The National Directorate of Meteorology
- The Directorate of the Ports and the maritime public domain under the responsibility of the Ministry of Infrastructure
- The Loukkos (ABHL) and Moulouya (ABHM) hydrological basin Agencies
- State secretariat to the Ministry of Energy, Mines, Water and Environment, responsible for Water and Environment. Department of the Environment.
- National Council on Climate Change (NC/CC) which is composed of representatives from the various ministry departments concerned.

- State secretariat to the Ministry of Energy, Mines, Water and Environment responsible for Water and Environment.
- National Scientific and Technic Council on Climate Change (NSTC/CC)
- Designated National Authorities CDM (DNA/CDM)
- National Council on Clean Development Mechanism (NC/CDM)

Vulnerable zones

- Low-lying topographies, particularly in estuary and laguna zones (Cao Negro Martil estuary, mouth of Mediterranean coastal wadis: Lao wadi, Ghiss, Neckor, Marchica laguna, Moulouya Delta).
- Fragile shorelines, subjected to an erosive action coupled to severe pressure from urbanization (bay of Tangiers, Mdiq Fnideq, Saidia cornice, etc.).
- A situation map is available showing vulnerable areas in coastal zones.

Impacts

Morocco's CNI focused on the country's great vulnerability to climate change impacts for two of the national economy key sectors, namely water resources and agriculture.

Scenario

National Direction of meteorology also uses the French model ARPEGE CLIMAT and intends to use its partnership with the European Forecasts Centre (ECMWF), Météo-France and UK Met Office for improving its high resolution climate change scenario simulations on Morocco; it also intends to develop its knowledge on the field of climate regionalization using the PRECIS model.

Model

- Use of model is a common practice, managed relatively well at national level. Some models have been used for a long time (1995).
- For climate projections, there is the MAGICC SCENGEN model.
- For Climate change assessment in Agriculture: The INRA used outputs of the HadCM3 general circulation model and the SDSM downscaling model.
- Water balance and crop growth: CROPWAT model was used for rainfed agriculture during the V&A study under the CNI and INRA used the DSSAT model for the same purpose.
- Water resources: During the assessment of the water sector V&A the models used were WATBAL and WEAP.

For MedicIP: links to documents

- AR4, GIECC/IPCC
- Website of the Department of Environment
- ACCMA project website : <http://www.pik-potsdam.de/~kropp/accma/index.html>
- Regional monographs of Mediterranean Moroccan regions
- Internal documentation Hydraumet

Annex 2.8 - Algeria

Background

High population concentration along the coast has resulted in a disproportionate urbanization, indeed the urbanisation rate rose from 26% in 1962 to 59,4% in 1998.

Available data

- Data on temperature and precipitation between the periods 1930-1961 and 1961-1990 database and a national information system on marine and coastal biodiversity in Algeria (SIGBIOMARAL)
- Since 2006, the availability of a Spatial data infrastructure and data base allows a good management of resources for the whole coastal zone concerning the 14 coastal wilayas and allowing a monitoring / supervisory of coastal and marine biodiversity
- Data available on water resources, water circulation in the Algerian basin, sea surface temperature, solid wastes and quantity of waste water treated.

Air temperature

- Average annual temperature on the Northern Algeria: period 1950-2005
- Comparison of average summer temperatures in Oran (1950-1995) and (1996 - 2005)
- Indices temperatures: eg: Trends based on the minimum night temperature indices and thermal amplitude
- For temperature and rainfall: meteorological stations in: Tlemcen, Oran, Dar El Beida of Algiers, Mascar, Annaba, Médea, Cheliff, Boughezoul. Data are available for the period from 1936 to 2006 (depending of the station).

Precipitation

- Average annual rainfall in different regions of Algeria
- Distribution of annual rainfall in Northern Algeria
- Annual rainfall in Northern Algeria 70 years
- Coastal rainfall variability for the period 1961 to 1990.

Evaporation

- Average annual potential evapotranspiration in northern Algeria
- Variations in temperature, precipitation, potential evapotranspiration and water index between 1931-1960 and 1961-1990

Unavailable data / others inefficiencies / needs

- There are no policies, programs and action plans specifically oriented towards assessing the effects of climate change on the coastal and marine ecosystem.

- On this issue related to the effects of climate change on the coast many weaknesses related in particular to the low sensitivity of populations, civil society and national authorities, where legislation still inadequate and not yet functional cross organization.
- The country is not prepared and does not have sufficient scientific and technical capabilities.
- Need to strengthen expertise in the definition of adaptation scenarios and technical capabilities required for their implementation.
- At national level, there is almost no specific document the problem-coastal climate change. The available evidence addresses the main aspects of inventory or in connection with human activities (marine pollution).
- The lack of sensitivity maps and vulnerability of the coastal zone (habitats and species) is another constraint to the assessment of the effects of climate change.
- The deficit in specific documentation on the issue of climate change in coastal constitutes a handicap for the establishment of a diagnosis of the situation.

Strengths

- Many environmental phenomena and events have been recorded in the coastal zone over the past 10 years, particularly those who have a direct or indirect link with the rise in water temperature or elevation level sea.
- Other phenomena related to changes in stocks of harvested species or reporting invasive or invasive species, the recurrence of colored water were also reported.
- Regarding the current capacity of Algeria in terms of observation it is important to note that the country participates through the *Office National de la Météorologie* to the World Meteorological Organization (WMO) network which is a global system for the collection, analysis and dissemination of weather information and other information on the environment.
- Algeria also decided to build two satellites: Alsat 2A and 2B Alsat.
- Existing *Plan Directeur d'Aménagement et d'Urbanisme (PDAU)* et *Plans d'Occupation des Sols (POS)*.

Monitoring programmes / National plans and programmes / Laws

- Algeria has ratified the CDB and CCNUCC and the Kyoto protocol. The UNFCCC national communications and national CBD reports are regularly submitted.
- Project APPL-CIRSA/ AMIS SMAP III/ CE/ 2006-2008: results of back coastline of coastal communities confirmed by the study of integrated coastal zone of the wilaya of Algiers.

National actions

- Elaboration of the ICZM strategy.
- Ranking and creation of MPA.
- Achievement of the national coastal land registry.

Laws

- The Act of 12 December 2001 on the development and sustainable development of the territory defines the guidelines and planning instruments.
- Actions translated into the *Schéma National d'Aménagement du Territoire* (SNAT) 2025 and du *Schéma Directeur d'Aménagement du Littoral* (SNAL).
- Law relating to environmental protection and sustainable development enacted in 2001 which complements the 1983 Act
- The « *Plan National d'Actions pour l'Environnement et le Développement Durable* » (PNAE-DD) fixed environmental programs in the country for 2001-2011.
- The National Reforestation Plan (NRP) is a long-term strategy for the planting of 1,245,900 ha, with the aim of getting the forestation rate from 11% to 13% by 2020.
- The strategy against desertification is implemented through the National Action Plan

Plans and action program for coastal zones

- Coastal area management programm for Algiers (CAMP),
- Strategic plan for the Mediterranean (SAP MED),
- Evaluation and control of marine pollution Program (MED POL),
- Strategic Action Plan for the Conservation of Marine Biodiversity in the Mediterranean (SAP BIO).

Networks/ networks and national structures / cross-border actions

- Supervisory networks:
 - Monitoring of levels of pollution (MATE/UNEP/MEDPOL project) at 16 coastal baseline and 17 sensitive coastal areas;
 - Monitoring of pollution trends (MATE / UNEP / MED POL project) by monitoring effluent and areas considered relevant;
 - The monitoring of levels of eutrophisation of marine waters (ONEDD / MATE project)
 - The monitoring of critical levels of fisheries operations (Ministry of Fisheries and Marine Resources);
 - The prevention and control against accidental marine pollution, through Tel Bahr system launched by MATE Bahr in conjunction with all relevant sectors.
- There are other networks of marine monitoring including:
 - Network monitoring *Posidonia oceanica* (RESPOSAL),
 - Network biomarkers (RES BIOMARQ AL),
 - Network monitoring toxic phytoplankton (RESPHTOX-AL).
 - Air pollution been a relatively routine monitoring at different levels by the resources allocated for this purpose by different institutions and structures.

List of institutions

- Ministères
- Observatoire National de l'Environnement et du Développement Durable (ONEDD)
- Institut National des Sciences de la Mer et de l'Aménagement du Littoral (ISMAL).
- Agence Nationale des Changements Climatiques (ANCC)
- Centre national de développement des ressources biologiques (CNDRB),
- Centre national des formations à l'environnement (CNFE).
- Conservatoire National des Formations à l'Environnement (CNFE)
- Les commissions intersectorielles sont installées au niveau des 14 wilayas côtières et sont composées de représentants de différents ministères au niveau local concernés par la protection du littoral.
- Direction Générale des Forêts (DGF),
- Conservatoire National du Littoral (CNL),
- Agence Nationale de la Protection de la Nature (ANN),
- Agence Nationale d'Aménagement du Territoire (ANAT),
- Centre National de Développement des Ressources Biologiques (CDRB),
- Service des Gardes Côtes,
- Agence Spatiale Algérienne (ASA),
- Office National de Signalisation Maritime (ONSM),
- Institutions scientifiques (universités, laboratoires de recherches, instituts spécialisés dans le domaine littoral),
- Entreprises portuaires,
- Entreprises industrielles en particulier l'entreprise d'hydrocarbures (SONATRACH),
- Associations de protection de l'environnement.

Funds

- Fonds national pour la protection du littoral et des zones côtières (FNPLIZC)
- Fonds pour l'environnement et la dépollution (FEDEP)
- Fonds National pour le développement de la pêche et de l'aquaculture (FNDPA)
- Fonds national d'Aménagement et du développement durable du territoire (FNAT)

Vulnerable zones

- The hot spots of this erosion are located in three main segments of beaches:
 - Brise Marine - Istanbul - Boat broken, with respectively 18.4 m, 16.8 m and 22.4 m;
 - Mohammedia - Mouth of Oued El Harrach: 24.4 m and 51.6 m;

- The entire area west of the wilaya of Algiers
- The most vulnerable area remains the center of the Bay of Algiers between the mouth of the Oued El Harrach and Mohammedia (51.6 m and 24.4 m of sandy beaches lost between 1959 and 1999).

Impacts

- The increasing of temperature and the rising of the sea level will occur the following effects:
 - The increased intrusion of seawater into coastal aquifers;
 - Additional difficulties in the supply of fresh water;
 - Changes in the areas of fisheries and aquaculture;
 - Increased in unprotected coastal strips and flood low-lying areas during storms;
 - Accelerated coastal erosion;
 - The loss of natural vegetation in marginal climates or in areas equipped with poor soils;
 - Increased risk of forest fires, and
 - The alteration of the composition and structure of biodiversity.
 - Recurrent cause impairment of crop yields and drought drying up of lakes
- Among potential socio-economic impacts of sea level rise, let's say:
 - Direct loss of cultural, economic, ecological, because of the loss of land, infrastructure and coastal habitats;
 - Increased risk of flooding to people, land and infrastructure and the consequent loss of values that represents risk;
 - Changes in the management of water, land and biological activity (fishing).
- Salinity intrusion in ground waters which occur loss of agricultural fields
- Increasing of draught periods which have impacts on:
 - The flow regime of wadis,
 - The groundwater recharge and the level of filling tanks dams, causing serious consequences on all socio-economic activities of the country and the environment,
 - The perturbation programs drinking water,
 - The decline in agricultural production,
 - The disruption of industrial activities,
 - The environment (pollution, forest fires, wasting the natural environment).

Scenario

- Climate projections on Algeria, in 2020, are provided through maps for the following seasons:
 - Autumn (September, October and November),
 - Winter (December, January and February),
 - Spring (March, April and May),
 - Summer (March, April and May).

Model

- Climate projections are determined by using the MAGICC model (Model for the Assessment of GHG Induced Climate Change). This is a model that provides estimates of changes in global average temperature, average rainfall and average sea level between 1990 and 2100 in 5 years, resulting scenarios of anthropogenic emissions of greenhouse gases (CO₂, CH₄, N₂O, halocarbons and SO₂).
- Seasonal climate forecasts on Algeria for 2020 are established by the UKHI (United Kingdom Meteorological Office High Resolution) model. This model was developed in England in 1989 by the Meteorological Service English.
- Climate projections for Algeria are also established by another model ECHMAR3TR adopting the same IS92A IPCC scenario. The model was developed in Germany in 1995 by the Max Planck Institute.

For MedICIP: links to documents

A lot of documents are available.

Annex 3: Recaps of national workshops (see the annex report)

- Moderation of the National Workshop in Albania, Tirana, Alexandre Borde, April 2013.
- Moderation of National Workshop in Bosnia and Herzegovina, Sarajevo, Alexandre Borde, April 2013.
- Moderation of National Workshop in Montenegro, Kotor, Philippe Coste, April 2013.
- Moderation of National Workshop in Morocco, Rabat, Philippe Coste, May 2013.
- Moderation of National Workshop in Palestine, Ramallah, Alexandre Borde, May 2013.
- Moderation of National Workshop in Egypt, Heliopolis, Philippe Coste, October 2013.
- Moderation of National Workshop in Algeria, Alger, Alexandre Borde, November 2013.