

DESKTOP STUDY OF THE NORTH AFRICAN SUB- REGIONAL CLIMATE CHANGE PROGRAMMES

**Adaptation, Mitigation and supporting and
enabling measures/means of
implementation**

DRAFT REPORT

January 2010

This draft report has been compiled by the Sahara and Sahel Observatory (OSS) and the United Nations Environment Programme (UNEP) as working document for the Consultative Meeting on the Draft Framework of North African Climate Change Programmes.

TABLE OF CONTENTS

TABLE OF CONTENTS	III
ACRONYMS	IV
EXECUTIVE SUMMARY	1
1. INTRODUCTION	5
1.1 FACING UP TO CLIMATE CHANGE RISKS IN AFRICA	6
2. METHODOLOGY	7
2.1 THE METHODOLOGY FOR THE DESK REVIEW	7
2.1.1 <i>ADAPTATION</i>	8
2.1.2 <i>MITIGATION</i>	8
2.1.3 <i>SUPPORTING AND ENABLING MEASURES/MEANS OF IMPLEMENTATION</i>	9
2.2 ACTIVITIES TO BE CARRIED	10
2.3 OUTPUTS	11
3. IDENTIFYING AND FILLING OF GAPS	11
3.1 ADAPTATION	11
3.1.1 <i>UNDERSTANDING ADAPTATION IN PRACTICE IN NORTH AFRICA</i>	12
3.1.2. <i>WHAT IS THE NATURE OF ADAPTATION TAKING PLACE?</i>	12
3.1.3 <i>WHERE ARE THE ADAPTATION ACTIONS OCCURRING?</i>	14
3.1.4 <i>WHAT ARE THE DRIVERS OF ADAPTATION?</i>	15
3.1.5 <i>CONCLUDING REMARKS</i>	17
3.2 MITIGATION	19
3.2.1 <i>ENERGY SECTOR</i>	19
3.2.2 <i>REDUCED EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION (REDD)</i>	24
3.2.3 <i>LAND USE, LAND-USE CHANGE AND FORESTRY (LULUCF)</i>	25
3.2.4 <i>USING AND MAXIMIZING OPPORTUNITIES FROM THE INTERNATIONAL CARBON MARKET</i>	27
3.3 SUPPORTING AND ENABLING MEASURES	29
3.3.1. <i>CAPACITY-BUILDING, INITIATIVES AND ACTIVITIES IN NORTH AFRICA</i>	29
3.3.2 <i>FINANCE</i>	33
3.3.3. <i>TECHNOLOGY DEVELOPMENT AND TRANSFER</i>	35
4. INDICATIVE RECOMMENDATIONS	37
4.1 KEY MESSAGE	37
4.2 BARRIERS TO INTEGRATING ADAPTATION AND DEVELOPMENT	37
4.4 TYPES OF UNCERTAINTY	39
4.5 POLICY RECOMMENDATIONS AND ACTIONS: PUTTING KNOWLEDGE INTO PRACTICE	40
4.6 PERSPECTIVES ON THE NORTH AFRICAN EXPERIENCE	43
5. RESULT SYNTHESIS	43
6. CONCEPTUAL FRAMEWORK FOR NORTH AFRICAN CLIMATE CHANGE PROGRAMMES	49
7. CONCLUDING REMARKS	51
ANNEX 1 :INVENTORY OF ADAPTATION AND MITIGATION ACTIONS IN NORTH AFRICA	49

ACRONYMS

AfDB African Development Bank	CDRT Centre de Développement de la Région du Tensift
ACCESS African Collaborative Centre for Earth System Science	CER Carbon Emission Reduction
ADEME Agence de l'Environnement et de la Maîtrise de l'Energie	CIDA Canadian International Development Agency
AfD Agence Française de Développement	CLICOM Climate Computing Project (World Climate Data Monitoring Programme)
AfricanNESS African Network of Earth System Sciences	CLIPS Climate Information and Prediction Services
AIACC Assessments of Impacts and Adaptations to Climate Change	CLIVAR Study on Climate Variability and Predictability (WCRP project)
AMASMer Association Maghrébine des Sciences de la Mer	CNT National remote sensing centre (Centre National de Télédétection – (Tunisa)
AMCEN African Ministerial Conference on the Environment	CNTS Centre National des Techniques Spatiales Algeria
ANER l'Agence Nationale des Energies Renouvelables (Tunisia)	COSMAR Coastal and Marine Programme
ARCE Observatoire des Changements Climatiques (Oran, Algérie)	CRTS Royal centre for remote sensing (Centre Royal de Télédétection Spatiale)
ASAL Algerian space agency (Agence Spatiale Algérienne)	CSES Center for Solar Energy Studies (Libya)
BAD Banque Africaine de Développement Organisation	CSP Concentrating Solar thermal Power
CCAA Climate Change Adaptation in Africa	CTF Clean Technology Fund
CDER Centre de Développement des Energies Renouvelables (Morocco)	DARE Data Rescue
CDM Clean Development Mechanism	DFID Department For International Development (UK)
	DISTA Département Des Sciences Et Technologies Avancées

DIVERSITAS International programme on biodiversity science

DLR German Aerospace Center

DMSP Defense Meteorological Satellite Programme

DNA Designated National Authorities

DPL Development Policy Loan

DRR Disaster Risk Response

ECOWAS Economic Community of West African States

ESD Energy For Sustainable Development)

ESSP Earth System Science Partnership

EU European Union

FAO Food and Agriculture Organisation (UN)

FFEM The French global environment fund (Fonds français pour l'environnement mondial)

GCM Global Climate Model

GCSS GEWEX Cloud System Study

GDP Gross Domestic Product

GEC Global Environmental Change

GECAFS Global Environmental Change and Food Systems

GECHH Global Environmental Change and Human Health

GEF Global Environmental Facility

GEF SPA Global Environmental Facility Support For Adaptation

GEOSS Global Earth Observation System of Systems

GFDRR Disaster Reduction and Recovery

GHG Greenhouse Gas

GIP MEDIAS-France (Toulouse).

CNTS, Centre National des Techniques Spatiales (Algérie).

CRASTE-LF Centre Régional African des Sciences de l'Espace (Casablanca, Maroc).

GIS Geographical Information System

GISP Greenland Ice Sheet Project

GLP Global Land Project

GOFC/GOLD Global Observation for Forest and Land Cover Dynamics

GTZ Deutsche Gesellschaft für Technische Zusammenarbeit

IDEAL International Decade for the East African Lakes

IDRC International Development Research Council

IDS Institute of Development Studies (UK)

IEA International Energy Agency

IFEED Internationales Forschungszentrum für Erneuerbare Energien e.V. Deutschland International Research Centre for Renewable Energy

IFPR International Food Policy Institute

IGAD Inter-Governmental Authority on Development

IGBP International Geosphere- Biosphere Programme

IHDP International Human Dimensions Programme

IIASA International Institute for Applied Systems Analysis

IIED International Institute for Environment and Development (UK)

iLEAPS Integrated Land Ecosystem-Atmospheric Processes Study

IPCC Intergovernmental Panel on Climate Change

IRI International Research Institute

ISOMer, Institut des substances et des Organismes de la Mer (Nantes, France).

ISPRES International Science Panel on Renewable Energy (ICSU)

IUCN World Conservation Union

IUGS International Union of Geological Sciences

IWMI International Water Management Institute

LUCC Land-Use and Land-Cover Change

MA or **MEA** Millennium Ecosystem Assessment

MDGs Millennium Development

MED-CSP Concentrating Solar Power for Mediterranean Region

MEDREC The Mediterranean Renewable Energy Centre

MedREP Mediterranean Renewable Energy Program

MEMEE Ministry of Energy, Mines, Water and the Environment

MENA Middle East and North Africa

MENAREC Middle East and North Africa Renewable Energy Conference

METAP Mediterranean Environmental Technical Assistance Program

NA North Africa

NEAP National Environmental Action Plan

NEPAD New Partnership for

NEPAD New Partnership for Africa's Development

NGO Non-Governmental Organisation

NIP National Indicative Plan

NTF-PSI the Norwegian Trust Fund for Private Sector and Infrastructure

OECD Organisation for Economic Co-operation and Development

OME Observatoire Méditerranéen de l'Energie

ONEP Office Nationale D'Eau Potable (Maroc)

ORMVAs Office Regional Mise en Valeur Agricole (Morocco)

OSS Sahara and Sahel Observatory, Tunis, Observatoire du Sahara et du Sahel

PRCM Regional Programme for the Protection of Coastal and Marine Resources

PV Photovoltaic

RAMSAR The Ramsar Convention on Wetlands Research Foundation

RE Renewable Energy

REDD Reduced emissions from deforestation and forest degradation

REs renewable energies

RSE Réseau de Surveillance
Environnementale

SADC Southern African Development
Community

SAFARI Southern African Regional
Science Initiative

SCOPE Scientific Committee on Problems
of the Environment

SIWI Swedish International Water Institute

SMAP Regional Euro-Mediterranean
Programme for the Environment

START System for Analysis, Research
and Training

TFESSD Trust Fund for Environmentally &
Socially Sustainable Development

TMIE Tunisian Ministry for Industry and
Energy

TREC Trans-Mediterranean Renewable
Energy Cooperation

UNCB United Nations Convention on
Biodiversity

UNCC United Nations Conference Centre

UNCCD United Nations Convention to
Combat Desertification

UNDP United Nations Development
Programme

UNEP United Nations Environment
Program

UNEP United Nations Environmental
Programme

UNFCCC United Nations Framework
Convention on Climate Change

USAID/REDSO

WCRP World Climate Research Program

EXECUTIVE SUMMARY

The Twelfth Session of the African Ministerial Conference on the Environment (AMCEN), held in Johannesburg from 7 to 12 June 2008 focused its attention mainly on climate change. Africa's extreme vulnerability to climate change is an established fact. The Ministers expressed grave concern about the scientific conclusions contained in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, particularly as they relate to the adverse social, economic and environmental impacts of climate change in Africa.

AMCEN also recognized at its 12th session the need to integrate Africa's existing and new climate change initiatives and programmes under a consolidated framework to ensure coordination and coherence in the implementation and review of climate change initiatives and sustainable development plans in the continent at all levels. In this regard an indicative outline developed by African Group of Experts¹ was adopted by the Ministerial Segment. The Ministerial Conference also decided to develop further a conceptual outline to serve as the basis for developing the comprehensive framework of African climate change programmes and its associated framework of subregional climate change programmes.

It is in this context that the Secretariat of AMCEN commissioned the Sahara and Sahel Observatory (OSS) to undertake a desktop review of the sub-regional climate change programmes in North Africa. This report, compiled by OSS in collaboration with UNEP, aims to review the existing and new processes, programmes and projects on climate change taking place in North Africa, with the view to compiling the background documents on past, current and planned climate actions in North Africa. The main outputs from this review include:

- i) An inventory of examples of adaptation in practice in North Africa, in the form of a worksheet;
- ii) This report, which describes the process of cataloguing the examples and interpreting the data; and
- iii) Develop a draft Conceptual outline of a draft comprehensive framework of North African climate change programmes (see Annex)

The inventory provides a compilation of existing and planned adaptation and mitigation actions that have occurred and or will occur in North Africa. It includes examples of climate change programmes, projects and initiatives in the public and private sectors, as well as voluntary and community groups, non-governmental organisations (NGOs) other associations and networks. The data presented in the inventory were collected primarily through literature review of secondary information including ministries annual reports in specific sectors: water (supply / flood management), construction, rural land-use (biodiversity and conservation / agriculture and forestry) and transport. It is also important to

¹ Expert Group Segment of the 12th session of AMCEN held in Johannesburg from 7 to 12 June 2008

note that this inventory may not be exhaustive of all the climate change programmes and projects existing in North Africa, but an indicative of the various actions and initiatives on climate change in the sub-region.

While developing the inventory, it became clear that there were a number of challenges in designing and collating such an assignment. They include the identification and categorization of the data using a specified set of criteria. The criteria used were as follows:

- Name of institution
- Overall summary including objectives and outputs
- Classification of adaptation (implementing adaptation actions or building adaptive capacity)
- Characteristics of adaptation (how adaptation is happening in the institution, i.e. policy, organisational or behavioral change)
- Rationale of adaptation (whether the adaptation is planned or unplanned)
- Triggers and drivers (the reasons why adaptation and mitigation are happening)
- Scale of intervention (i.e. the level at which adaptation is happening: international, European (EU), national, devolved administrations, regional, local, individual)
- Geographic location of adaptation and mitigation
- Size of institution
- Ownership of the institution (i.e. Public, private or other)
- Source of information

Another challenge came in drawing conclusions across different sectors. It is difficult to compare the sectors owing to the nature of the inventory which was rather inexhaustive but only a representative. The inventory shows that there are a range of adaptation actions taking place in North Africa. Within each sector that was investigated, adaptation is already happening though the actions being undertaken are still at their 'infant stages'. There are examples of practical actions being implemented; and most of them are more focused on building the adaptive capacity. This is evident through the recruitment of individuals, establishment of 'think tank' groups and or task forces on climate change and its related aspects. Moreover, there are also some changes in policy formulation and laws to support adaptation in the future. The majority of the adaptation actions identified are occurring in the public sector, however, there is little evidence of behavioral change in either the public or private sectors. Most of the examples are occurring at the national scale, decentralized administrations, regional scale with few examples at local levels.

Compilation of the inventory has highlighted the extrinsic link between development and adaptation. This has contributed further to the difficulty in classifying the adaptation actions, in particular, which ones should fall under 'planned adaptation to climate change and those that fall under development. This implies that it is difficult to distinguish which adaptation actions are taking place as a response to weather related (rather than risk factors) and of these, which are a response to the expected future climate change. These two difficulties are related to: First identification of drivers of change and delineating which of these actions can be classified specifically as adaptation to climate change impacts . The second,

involves the timing of the adaptation, i.e. is it a deliberate response to an impact or is it purely coincidental?.

There is a mix of planned and unplanned adaptation taking place. Most of the examples that we came across were planned and deliberately being carried out in response to the impacts of climate change and the need to adapt. However, it is worth noting that the classification on the basis of 'planned' and unplanned' in this inventory reflects the subjective decision of the authors based on understanding of the secondary information. As a result, any adaptation action could generate adaptive responses that may or may not be beneficial. In some cases, climate change is potentially being used to support an action that is desired as a co-benefit, again not all of these could be beneficial.

Capitalizing on climate change as a trigger for change in the private and public sector is not strategic. Already most institutions are driven by factors and pressures from external sources, including resource availability. This review suggests that climate change adaptation be understood as a process rather than one point intervention, thus the need to build on many different approaches and strategies that incorporates existing networks and partnerships. Since most current adaptation efforts are justified as co-benefits and/or are 'no regret' options, this should remain central when developing new governmental policies and strategies that do not relate to climate change.

Capacity building initiatives and technology transfer are needed to help North Africa develop energy efficient systems that minimise global greenhouse gas emissions. In the process of such collaboration, both institutions and individuals will improve their capacities to do assessments and understand climate change better, to minimise social, environmental and economic losses

While taking into consideration the needs of different social categories, particularly the poor, North Africa countries are advised to work on energy systems that bring social justice, and induce its economic development and climate protection. In this context, there is a need for developed countries as well as regional and international financing institutions, such as the World Bank, the European Investment Bank and Arab Funds, to scale up their technical and financial assistance to countries in the North Africa region on renewable energy programmes including technology transfer and indigenization, and capacity building to support local manufacture of renewable energy.

All North Africa countries have an outstanding potential for solar energy. Using concentrating solar thermal power (CSP) plants to power sea water desalination on either by electricity or in combined generation process with steam has the potential to solve the water scarcity problem in North Africa. Contrary to the conclusions of most contemporary strategic analysis of North Africa water sector, seawater desalination can in fact have a greater share on freshwater supply that will be affordable for all countries. It will be based on a domestic energy source and will have limited environmental impacts, if concentrating solar power (CSP) is used for energy supply.

The institutional frameworks for the CDM market in North Africa are now in place, even though personnel capacity, competency and expertise at the agencies responsible are in most cases still inadequate, and as at the time of this analysis, North Africa has not acquired a clear profile as a CDM project destination. Even though the region is considered a forerunner in Africa when it comes to energy and environment policy, no explicit priority seems to have been attached to CDM as yet. With the help of international organisations and bilateral cooperation, however, progress is likely on capacity building in the sub-region during the next few years and it can be expected to play a more active role in the international CDM market in the near future.

Finally, a draft conceptual framework is proposed for studies on vulnerability mitigation and adaptation to climate variability and change, generally applicable to a wide range of contexts, systems and hazards. Social vulnerability is distinguished from biophysical vulnerability, which is broadly equivalent to the natural hazards concept of risk.

1. INTRODUCTION

North Africa is highly vulnerable to impacts of climate change, even though its greenhouse gas emissions are relatively small compared to the developed countries. The region has the world's worst water scarcity, reliance on climate-sensitive agriculture, people and economic activity concentrated along the coastal zones, and conflict-ridden areas where pressure on resources could escalate violence and political turmoil. Climate change poses serious threats to sustained economic growth and poverty reduction, the quality of life, and political stability in the world. According to the Intergovernmental Panel on Climate Change (IPCC)², Africa is the most vulnerable continent to climate change and climate variability; and the situation is aggravated by the interaction of multiple stresses occurring at various levels, and is further compounded by low adaptive capacity.

North Africa will experience a temperature rise very likely larger than the global mean annual warming. At the same time, most parts of the sub-region are expected to experience reduced average annual rainfall and increased aridity and droughts. The combination of reduced rainfall and hotter temperatures is expected to result in a net drying and increased aridity for a greater proportion of the continent³. It is important to note that all African countries are likely to be drastically affected by climate change

While Africa contributes little to the total greenhouse gas emissions in the atmosphere, it will bear the brunt of the negative impacts of resulting climate change. African leadership, through the African Union and several sectoral Ministerial Conferences, in particular the African Ministerial Conference on the Environment (AMCEN) is increasingly cognizant of the developmental challenges posed by a changing climate and has placed considerable priority to addressing the adverse impacts of climate change in the continent. For instance, the Twelfth Session of the AMCEN, held in Johannesburg from 7 to 12 June 2008 focused its attention mainly on climate change. Africa's extreme vulnerability to climate change is an established fact, and the reality lives with us. The Ministers expressed grave concern about the scientific conclusions contained in the Fourth Assessment Report of the, IPCC particularly as they relate to the adverse social, economic and environmental impacts of climate change in Africa.

AMCEN also recognized at its 12th session the need to integrate Africa's existing and new climate change initiatives and programmes under a consolidated framework to ensure coordination and coherence in the implementation and review of climate change initiatives and sustainable development plans in the continent at all levels. In this regard an indicative outline developed by African Group of Experts¹ was adopted by the Ministerial Segment.

² IPCC, 2007: Africa. Chapter in the working group 2 volume of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva.

³ IPCC 4, 2007

The Ministerial Conference also decided to develop further a conceptual outline to serve as the basis for developing the comprehensive framework of African climate change programmes and its associated framework of subregional climate change programmes.

It is in this context that the Secretariat of AMCEN commissioned the Sahara and Sahel Observatory (OSS) to undertake a desktop review of the sub-regional climate change programmes in North Africa. This report, compiled by OSS in collaboration with UNEP, aims to review the existing and new processes, programmes and projects on climate change taking place in North Africa, with the view to compiling the background documents on past, current and planned climate actions in North Africa. The main outputs from this review include:

- i) An inventory of examples of adaptation in practice in North Africa, in the form of a worksheet;
- ii) This report, which describes the process of cataloguing the examples and interpreting the data; and
- iii) Develop a draft Conceptual outline of a draft comprehensive framework of North African climate change programmes (see Annex)

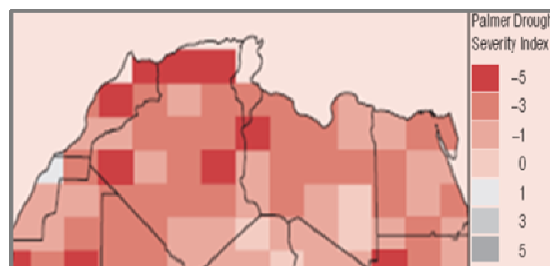
1.1 Facing up to climate change risks in Africa

The impact of climate change on development is multifaceted. First, meteorological and hydrological extremes and their impacts, such as heat waves, droughts, sea level rise, storms and floods pose direct threats to lives, livelihoods, and socio-economic aspects. Second, climate variability has a major impact on the performance of developing economies especially, because of their high dependence on natural resources, including rain-fed agriculture. Third, climate change can cause the underperformance of investments (e.g., new crops or irrigation investments resulting in low returns if rainfall either increases or decreases substantially). Fourth, climate uncertainty and unpredictability can be a powerful deterrent to investment, permanently reducing economic growth. Fifth, climate variability and extreme events compromise the sustainability and performance of economic and social infrastructure assets and reduce the economic and financial rates of return. Lastly, the poor suffer disproportionately from climate change phenomena, undermining the effectiveness of poverty reduction efforts.

The combination of reduced rainfall and hotter temperatures is expected to result in a net drying and increased aridity for a greater proportion of the continent (Map 1). It is important to note that all North African countries are likely to be drastically affected by climate change. In addition and more recently, the AMCEN held in Johannesburg from 7 to 12 June 2008 have explicitly requested countries to be more proactive in promoting clean energy and “green transition”. While Africa’s role in the causes of greenhouse gases (GHG) is limited, there is a continuous need to address mitigation through the promotion of low carbon technology and infrastructure options which clearly address climate risk mitigation.

The loss of livelihoods due to drought is a major trigger for population movements, which can cause additional disease burdens. Droughts, especially in rural areas, have a tendency to influence migration into cities, increasing urbanization and stressing the socio-economic conditions already exacerbated by high levels of urban population growth. It is estimated that about 72% of the dwellers in African cities live in slums that have particularly poor drainage facilities and are quite often prone to rising sea level could affect many of the regions' coastal cities, particularly in low-lying areas in Egypt, Tunisia and Morocco. For instance, in Egypt there are increasing concerns about how rises in sea levels might impact the Nile Delta.

Map 1: North Africa Drought Severity under Scenario A2 in 2090s as Compared to 2000
 Map has poor resolution. The Palmer Drought Severity Index uses temperature and rainfall information in a formula to determine dryness overtime.
 It uses a 0 as normal, and drought is shown in terms of minus numbers: for example, -1 is moderate drought, -3 is severe drought, and -5 is extreme drought.



It has been estimated that a sea level rise of 50 centimeters in the Delta could displace over 2 million people, flood 1,800 square kilometers of cropland, and generate some \$35 billion damage in terms of loss of land, property and infrastructure. In addition, strategic water storage infrastructures such as Lake Nasser are likely to be exposed to increased evaporation and more frequent flood risk.⁴

2. METHODOLOGY

2.1 The methodology for the desk review

Based on the terms of reference, the methodology focused on collecting, collating and reviewing of the existing and new intergovernmental decisions and initiatives and programmes on climate change in North Africa under (i) adaptation; (ii) mitigation; and (iii) supporting and enabling measures as proposed in the conceptual framework adopted by the twelfth session of AMCEN and further endorsed by its Third Special Session meeting in Nairobi in May 2009.

The methodology adopted embraces the following principles: (i) provide broad and inclusive overview of the information on Disaster Risk Reduction (DRR) and related initiatives, (ii) record information in a neutral and uncontroversial manner, (iii) build on and add to the existing stocktaking and mapping initiatives, (iv) adopt a user friendly approach to encourage participation for information sharing and access, (v) develop a sustainable tool

⁴ IPCC AR4 2007

which will serve to update information periodically in the region, and (vi) focus on regional initiatives.

The methodology was based on a range of tools and methods for data collection, including (i) networks analysis, (ii) web-based and online databases, (iii) desk studies, (iv) participatory approaches that involve information providers through (v) telephone interviews, (vi) competency mapping, and (vii) questionnaires

2.1.1 Adaptation

Under the adaptation, the inventory provides a compilation of adaptation actions that have occurred and or / are planned for the sub-region to date. It includes examples of adaptation to climate change in the public and private sectors, as well as voluntary and community groups, non-governmental organisations (NGOs), including associations and networks. The data presented in the inventory (Annex1) was collected primarily through literature review of secondary information identified in consultation with key experts in the following sectors: water (supply / flood management), construction, rural land-use (biodiversity and conservation / agriculture and forestry) and transport. The review also describes the process of cataloguing the climate change programmes and some examples are presented in the form of a worksheet.

Examples of adaptations in four sectors are considered: the water sector (water supply and inland and coastal flood management); the construction sector; the rural land-use sector (biodiversity / conservation and agriculture / forestry); the transport sector. Within each sector, the adaptation is described in terms of: the range of institutional actions, outputs; classification; characteristics; the purpose; scale; and the drivers. These examples are not necessarily exhaustive representation of adaptation in practice across North Africa, they are simply indicative examples that were mapped during the exercise.

The adaptation programmes were categorized into three broad areas of work namely:

- (a) Disaster reduction and risk management: including early warning, preparedness, emergency response and post-disaster recovery;
- (b) Sectoral planning and implementation: adaptation in key sectors including water, agriculture, coastal zones, health, infrastructure, biodiversity and ecosystems, forests, energy, urban management and tourism, taking into account the cross-sectoral implications;
- (c) Building economic and social resilience through the diversification of economies to reduce dependence on climate-sensitive sectors, including through the use of indigenous knowledge and practices and the strengthening of community organizations

2.1.2 Mitigation

To implement sustainable development policies and mitigation measures in Africa, with special emphasis on the development of indigenous and local communities, women and children in Africa, the following key areas of mitigation work were identified:

- (a) *Energy sector*: Including scaling up investment to provide access to affordable cleaner energy, especially for rural communities; development of appropriate alternative energy sources; policies and measures to increase energy efficiency; precautionary approach to the development of renewables such as biofuels for mitigation and energy security;
- (b) *Reduced emissions from deforestation and forest degradation (REDD)*: Including the development of market-based mechanisms to reward or provide incentives for forest conservation or the avoidance of deforestation and sustainable forest management practices;
- (c) *Land use, land-use change and forestry*: As the primary source of emissions in Africa, this represents one of the key areas for mitigation work in the continent, which includes best practices to enhance carbon sequestration and reduced emissions;
- (d) *Using and maximizing opportunities from the international carbon market*: Africa is to call for binding ambitious targets for developed countries to secure the price of carbon. Key areas of work for Africa include reforming the rules of market mechanisms such as the Clean Development Mechanism to increase accessibility by African countries, the full implementation of the Nairobi Framework and building capacity in Africa to gain access to the available financial mechanisms (the Clean Development Mechanism, Global Environment Facility, the World Bank and the African Development Bank, among others).

2.1.3 Supporting and enabling measures/means of implementation

Three categories of supporting and enabling measures have been identified to support Africa's efforts to adapt to and mitigate climate change. These should form an integrated package of support tailored to each climate change intervention.

2.1.3.1 Capacity-building

9. Capacity-building measures include the following:

- a) To enable human resource development through focused training, mentoring and learning-by-doing approaches, among other measures;
- b) To empower relevant institutions at various levels;
- c) To enhance observation, research and knowledge management;
- d) To strengthen communication, education and awareness-raising at all levels, especially at the local and community levels;
- e) To strengthen and use the regional networks of information and knowledge-sharing;
- f) To develop tools, methods and technologies and support their application;
- g) To encourage and strengthen participatory and integrated approaches in planning and decision-making, including the meaningful participation of civil society;
- h) To share experiences, information and best practices of African countries;
- i) To assess, strengthen and mobilize the capacities of existing relevant facilities and institutions in Africa.

2.1.3.2 Finance

Sources of financing were scaled up, including the following:

- a) National or domestic investment;
- b) Multilateral funding: grant, loan and concessional;

- c) Bilateral investment and donor funding;
- d) Insurance and other risk management instruments;
- e) Private sector instruments;
- f) Market-based instruments, e.g., carbon finance;
- g) Improving access to financing;
- h) Rationalizing the ever-growing number of

2.1.3.3 Technology development and transfer

The development and transfer of technology are critical to the achievement of both adaptation and mitigation programmes in Africa. Key areas of work in the field of technology include:

- a) Enhancing technology development and transfer, including hard technologies (e.g., drip irrigation, water harvesting, drought-resistant crop varieties, renewable energy technologies, building technologies, etc.) and soft technologies (e.g., knowledge, systems, procedures, best practices);
- b) Addressing technology transfer barriers, including rules of trade tariffs, intellectual property right-barriers and technical trade barriers (standards, ecolabelling); and
- c) Enhancing and supporting the research and development capacity in African countries to foster the development and local manufacture of cleaner mitigation and adaptation technologies;
- d) Enhancing technology cooperation between African countries and others, particularly the Africa-European Union joint strategy, Africa-China, Africa-India, Africa-South America and the Tokyo International Conference on African Development cooperation programme with Japan, including through encouraging member States to develop specific programme proposals and submit proposals for consideration.

2.2 Activities to be carried

- (a) Collect, collate and review existing and new intergovernmental decisions, as well as policy and implementation initiatives and programmes on climate change in the sub-region under the following headings: (i) adaptation, (ii) mitigation, and (iii) supporting and enabling measures / means of implementation;
- (b) Complement desk review through contact with relevant organizations and institutions leading the processes / the formulation and or implementation of the initiatives, programmes and projects where necessary;
- (c) Develop an enhanced conceptual outline to serve as the basis for identifying and filling gaps in, and identifying future priorities for a comprehensive framework African climate change programmes to be developed;
- (d) Identify gaps in the coverage of the existing and new decisions, initiatives, programmes and projects and provide a list of indicative recommendations for filling such gaps.
- (e) Develop a conceptual framework of African climate change programmes taking into account the results of the activities above;
- (f) Prepare report containing existing and new intergovernmental decisions as well as policy and implementation initiatives and programmes on climate change in the sub-region and a set of recommendations for decision making. Full list of all names, and

contact details of people that have been interviewed as part of the project should be included.

2.3 Outputs

Activities description	Outputs
Collect, collate and review exiting and new intergovernmental decisions and initiatives and programmes on climate change in Africa under (i) adaptation; (ii) mitigation; and (iii) supporting and enabling measures.	Relevant information collected and collated.
Complement desk review through direct contact with relevant organizations and institutions leading the processes/the formulation and or implementation of programmes and projects where necessary.	Relevant information validated.
Develop an enhanced conceptual outline to serve as the basis for identifying and filling gaps in a comprehensive framework of African climate change programmes.	Development of a conceptual outline of a comprehensive framework of African climate change programmes initiated.
Identify gaps and make indicative recommendations for filling such gaps.	Gap identification and indicative recommendations made.
Develop a conceptual comprehensive framework of African climate change programmes	Conceptual outline of a draft comprehensive framework of African climate change programmes developed.

3. IDENTIFYING AND FILLING OF GAPS

3.1 Adaptation

Three broad areas of work were identified:

- a) Disaster reduction and risk management: including early warning, preparedness, emergency response and post-disaster recovery;
- b) Sectoral planning and implementation: adaptation in key sectors including water, agriculture, coastal zones, health, infrastructure, biodiversity and ecosystems, forests, energy, urban management and tourism, taking into account the cross-sectoral implications;

- c) Building economic and social resilience through the diversification of economies to reduce dependence on climate-sensitive sectors, including through the use of indigenous knowledge and practices and the strengthening of community organizations.

Steps for effectively implementing work in the above three areas include:

- a) Understanding climate and climate change processes, vulnerability and risks, including, but not limited to, through monitoring and observation systems;
- b) Understanding the economics of adaptation;
- c) Understanding the social and cultural dimensions of adaptation;
- d) Policy setting and planning, including climate-proofing of future development;
- (e) Piloting and demonstrating;
- (e) Full-scale implementation.

3.1.1 Understanding adaptation in practice in North Africa

This section presents the thoughts and reflections on adaptation in North Africa. The inventory (Annex 1) shows that there are a range of adaptation actions taking place in the North Africa across sectors and institutions. Within each sector investigated, adaptation is already happening , although each sector is still at its 'early stages' in terms of implementing the adaptation actions.

The majority of examples in the inventory were found in the public sector. Most are contributing to the creation of adaptive capacity, which would support companies and government at a later stage to be able to respond to the impacts of climate change. The 'capacity' appears to emerge through the process of 'learning by doing' on the potential impacts of climate change and their possible adaptation options, as a prerequisite for implementation of adaptation actions. The examples of adaptation actions documented have been driven by a host of factors ranging from personal motivations, response to regulations, sustainable development and financial pressures. There are clearly many drivers of change within each of these sectors that are inter-related, increasing their complexity. Waiting on climate change to drive change in North Africa institutions in the private and public sector may not be worthwhile either in terms of precaution, or the reality of what drives change in the sub-region. It must be remembered that adaptation is a process and context specific, hence, 'one size fits all' does not apply, and greater understanding of the reality of change in the various sectors at different scales are fundamental in any change management process. The review explicitly capitalizes on building into existing policy frameworks.

This section endeavours to answer some of the questions that underpinned this analytical review: What are the natures of adaptation actions taking place? How are the adaptation actions taking place? and What is driving adaptation?

3.1.2. What is the nature of adaptation taking place?

This section addresses the way in which adaptation is taking place, whether it be building adaptive capacity or implementing adaptation actions. It discusses the data presented in section three and their implications. This section also discusses the objectives of adaptations, i.e. whether they are planned or unplanned, and what this means in the context of adaptation in the sub-region.

3.1.2.1 How is it occurring?

The review shows that there exists more programmes, initiatives and programmes on planning, specifically building adaptive capacity than of implementing concrete adaptation actions across all sectors. The sectors are contributing to building of adaptive capacity in different ways, for example in the construction and water sectors, organisations are building adaptive capacity via the adoption of sustainable development practices, particularly through the private sector. In the transport and biodiversity and or/ conservation, the focus is more on research into the impacts, vulnerability assessments so as to identify ways to improve or change management practices accordingly. In the water sector, building adaptive capacity has emphasized on water efficiency campaigns which are driven by physical water shortages and legislation. The North African Governments have significant knowledge about the anticipated impacts of climate change on farmers, and has already taken significant steps to assist farmers to adapt to these impacts. However, the extent of climate change impacts which are anticipated to affect North Africa's agricultural sector draws attention to the need for a regional approach.

Although there are few examples of concrete adaptation actions being implemented, the significance of understanding the impacts of climate change on institutions and the options that they have to respond must not be underestimated. This is possibly the most important stage at which the North Africa public institutions can take the lead to strengthen their capacity. However, planned adaptive capacity building needs to be long term, and requires sufficient resources to ensure sustainability of the networks and partnerships.

The likely reason why many examples of the projects focus on building adaptive capacity could be attributed to uncertainty of the future climate change impacts that might be expected. Many of the examples are on research that has been or is being carried out to investigate these impacts and what the options for adaptation might be. A further explanation might concern the time-scales on which most institutions operate. While climate change is a long-term problem, requiring continuous planning and review, most institutions are faced with short-term measures, owing to the fact that most of these efforts are undertaken under limited project time span.

3.1.2.2 Is it planned or unplanned?

Most of the examples of the programmes are on planned adaptation rather than unplanned. The examples of planned adaptation actions include those which have highlighted climate change as a key driver. Still, it is noticeable that for many of the planned adaptations,

climate change is only one of multiple stressors that are interrelated increasing the complexity.

Unplanned adaptation often seems to be the result of a 'side-benefit' of an action or decision taken for other reasons. In the land use sector, there are few examples of planned adaptation to climate change across North Africa. There exist a small number of *ad hoc* examples of farmers and voluntary initiatives to improve farming practices, largely driven by sustainable development policy at the local and regional levels. Not only is the information on the impacts of climate change uncertain, farmers who are key actors are often under represented in important decision making processes. Similarly, accessibility of information on the impacts of climate change is not sufficient incentive to promote concrete adaptation.

3.1.3 Where are the adaptation actions occurring?

This section addresses where adaptation is occurring, whether it in public or private or other institutions. It goes further to discuss the scale of the adaptation actions, focusing in particular on the administrative and management scales at which they are taking place.

3.1.3.1 Institutions

The inventory shows evidence of adaptation occurring under collaborations of various different institutions, public, private including community-based. However, most of the initiatives documented in North African sub-region are majorly in the public sector, and involves decentralized administrations, particularly in Government Ministries and Departments, and their agencies. For example, the personal communication with the some of the key experts illustrates that across the sub-region, strategies, programmes, policies and legislation are increasingly addressing the impacts of climate change. Moreover, policy and organizational related changes that consider adaptation were more commonly found than evidence for behavioral change. In contrast, institutions such as community-based organisations, small-scale farmers and the rural land use sector, for example, behavioral change was the more dominant aspect.

3.1.3.2 Scale and location

The review took note of the different scales of administration or management, and geographical location of the adaptation actions. Across sectors, focus was on central government, regional and local authorities and so on. Adaptive capacity building is taking place largely at the national scale, e.g. in national government policies and programmes. In the construction sector, although there exist national policies, programmes, associations and networks that provide advice and directions on how to address climate change, this information does not appear to be trickling down to the private, individual and local levels, thus the disjoint between the central government and the lower levels.

On the same note, the importance of International Directives and their impacts on the sub-regional climate and other policy issues became apparent, and it was clear that these

regional initiatives indirectly contribute to adaptation in particular in the rural land use, agriculture and water sectors. In the rural land use sector the Common Agricultural Policy has had significant impact. Yet, there is increasing awareness among government agencies and their decentralized administration on the need to link climate change with biodiversity and ecosystem conservation. As a matter of fact, several important projects have highlighted this important link. Thus, a great deal of information and policy advice has been provided by the central government to the periphery organisations and public bodies. Despite all these efforts, it is less clear however, as to the number of institutions that are implementing these recommendations. Again, these initiatives are still in their infancy stages; hence require regular and continuous monitoring and evaluation to understand the impacts of building adaptive capacity in the sub-region.

Climate change impacts are spatially varied as highlighted by this work. The geographical location influences where adaptation is happening and the type of adaptation, which depends on the geographical and the social structures in place. The analysis of the water sector shows, for example, that across North Africa there is different water availability and demands. In those locations experiencing shortages, notably the South East and South West, local authorities and small and large water companies are engaging in water efficiency campaigns in efforts to encourage the consumers to economize water. These companies are driven by the need to maintain water supply to their customers through pricing and regulation.

In North Africa region, the northwest is expecting to see changes to the landscape and pollution to water courses. Workers are likely to experience heat stress in buildings not designed for a warmer future. People are vulnerable to flooding and drought and structural problems associated with clay based soils, as well as increased pest and disease. Meanwhile the North is estimated to suffer the impacts of sea level rise and associated coastal erosion, as well as toxic sediments in estuarial waters. Some studies of coastal vulnerability use the concept of risk. Sea level rise should be considered as a certainty; it has been rising, for the last two centuries and regardless of any climate change mitigation strategy will continue to rise in the future centuries.

In summary, the adaptation priorities and options seem to depend on both the biophysical geography (e.g. risk of flooding, drought) and socio-economic and governance system (e.g. devolved administrations). This needs to be taken into account in planning for adaptation. Each location might require different action plans and resources to address adaptation.

3.1.4 What are the drivers of adaptation?

This section identifies the drivers of adaptations and its associated challenges. The analysis shows that there exists a number of drivers, which are sometimes not often directly related to climate change. Building adaptive capacity is often associated with indirect drivers such as sustainable development policies, regulations and corporate social responsibility. There also exists a number that are directly driven by climate change related events, i.e. droughts and flooding. Sectoral plans and policies were incorporated into the design and

implementation of emergency preparedness, response and recovery programmes in the corresponding ministries. The envisaged national strategy requires the incorporation of disaster risk reduction (DRR) into the design and implementation of emergency response, recovery and rehabilitation processes at all levels. Lessons learned from previous disasters are often included in the pre-disaster planning in order to avoid past mistakes and address the underlying causes of risks.

In this context, post-disaster reviews are routinely undertaken to evaluate the responses and actions taken after any incident to derive lessons learnt on risk reduction. These lessons are normally incorporated into sectoral plans and response preparedness. Mechanisms and tools are being adopted for the implementation of environmental management and post-disaster recovery programmes. For example, lessons learnt from the recent earthquakes and the 1994 flash floods, in both Morocco and Algeria, have initiated the introduction and the enforcement of building codes and prevention of construction in hazard prone areas that are highly susceptible to earthquakes and or flash floods.

Given the imbalanced state of water resources in an increasingly urbanizing MENA region, calibrating water demand with available supply is the most vital step to reduce the climate change effects but warrants sector-wide policy and institutional reforms. The effects of climate change could re-affirm the urgency of implementing these new policies and reforms without delay so as to make water resource management more environmentally, socially, economically and financially sustainable. These reforms present opportunities and very cost-effective ways to mitigating, containing and/or delaying some of the climate change effects in the future. Therefore, improving ground and surface water demand management and services coupled with associated environmental health gains require sector-wide reforms in most MENA countries to overcome the current state of governance, i.e., accountability, organizational capacity, and physical resources.

More specifically, judicious governance reforms have the potential to allow for more accountability in terms of: efficient water allocation to the highest value use (trade-offs valuation); transparent decision-making that should be shielded from political / interest pressures with water allocations being responsive to demand and supply variability; and enforcing rules and regulations to ensure equity, quality service provision, environmental health outcomes and preservation of the commons. Also, institutional reforms should improve the organizational capacity in terms of: integrated planning that could help secure sustainable public and private water and wastewater investments; effective regulation of providers; demand management that secures reliable services; and water supply management through regional and national river basin management that would help arbitrate water allocation among countries and sectors especially during drought events.

In analyzing the review, it became clear that identification of the drivers of change were often difficult if not impossible. In particular the difficulties encountered were:

- The drivers of adaptation are generally complex and interlinked.
- Drivers may not be directly climate related but actions are worth doing anyway, e.g., adaptations by the construction industry make sense under their existing sustainable development policies or adaptations in the rural land use sector.

- Many drivers of adaptation are not climate related, even though climate is just one of the drivers.
- A lot of events such as flooding, storms and other extreme events are noted as drivers. Whereas experts may see these as indications of climate change being a driver, institutions and individuals do not necessarily perceive them as climate change. For example, flooding is perceived by some individuals as a problem of building on floodplains rather than an indicator of climate change (case of *Ourika* valley, in the High Atlas of Morocco). A lot of the adaptation examples in the water sector are driven by flooding but are unplanned in a climate change context because the flooding event is unrelated to climate change.

3.1.5 Concluding remarks

In spite of the potentially low adaptive capacity of Africa, institutions and individuals have developed adaptation strategies to face the great climate inter-annual variability and extreme events across various levels. Those communities who have faced harsh environmental conditions over prolonged periods have consequently been trying, testing, and adopting different types of coping strategies.

Specific findings include:

- (a) There is a strong need to ensure that the reality on the ground in particular on institutional and technical skills limitations, is properly linked to the process being used by activities in this sub-region. Because of the large anticipated impacts and the limited, yet growing capacity, it is essential that methods and tools employed be based on what works for the sub-region.
- (b) The baseline for sustainable development is weak and therefore the additionalities linked to the impacts of climate change poses a major challenge. The policies to be developed and tools to be introduced need to have the dual purpose of advancing the baseline and adding the concerns on climate change.
- (c) Given that regulating services are neither consumed directly nor sold to generate income, their role in adaptation is less easily demonstrated than for provisioning services. Their role in local livelihoods and adaptation is indirect and the case studies and evidence show that it is as equally important. Because the poor frequently reside in marginalised areas, both in rural and urban localities, they are most susceptible in situations where regulating services have diminished, for example flooding, drought, poor air quality, higher disease incidence, and degraded or exhausted soils.
- (d) This review pin-points the pressing need for capacity in the region for determining vulnerability to climate change and impacts assessments for critical sectors such as agriculture (crop yield changes, irrigation requirements); water resources (rainfall variability and extreme events-flooding/drought); coastal resources and tourism.

Given the crucial role of tourism for the economies of small islands, Mountains, Oases and Desert, , it is important to lay more emphasis on this sector.

- (e) Elaborating on details relating to the mechanisms and methodologies for mainstreaming adaptation measures in North Africa is crucial and necessary in light of the very diverse economies of the Sub-Region (Industrialization, tourism and off-shore banking, agriculture). Vulnerabilities to climate change and variability also depends on other factors such as geographical location.
- (f) The experience in developing countries is that it is very difficult to mainstream adaptation policies by themselves. It is very often easier to link climate change with other challenges to facilitate its acceptance. North African countries often claim that there are more pressing economic and environmental problems than climate change. In agriculture, for instance, linking climate change with crop yield and farm profitability, as well as examining the influence of markets and other factors such as on farm subsidies and unemployment, may be advisable. By bringing climate change issues closer to the minds and agenda of policy makers in the region, projects can potentially play a significant role in addressing the issue.
- (g) Sensitization of North Africa governments and peoples to climate change and variability, including sea level rise and their potential impacts, is highly necessary to promote sustainable development in the face of GHG climate change.
- (h) Increased capacity and appreciation of economic decision-making tools. Many project supported capacity building at the regional and national level in economic tools (economic valuation of natural resources and the formulation of economic instruments) for decision-making and opportunities to strengthen policy design through pilot activities. Specifically the project developed basic methodologies, provided training and supported the countries in designing and implementing pilot studies.
- (i) In situations where national capacity is weak in regional and global issues, a responsive, flexible, regional coordinating mechanism is an effective means of engaging the collective capacity of existing institutions and building capacity by acting as a clearing house for information and resources.
- (j) Political buy-in is a major implementation and sustainability issue in adaptation to climate change and can be enhanced through a highly visible regional coordination institution, multi-stakeholder committee, public awareness campaigns and involvement of a variety of relevant national ministries. Equally, there is a need to change and or develop economic instruments and incentives to promote the climate change agenda.
- (k) Maximizing national participation without overloading the institutions is a major implementation challenge in regions with limited capacity. This can be dealt with

through: careful assessment of capacity; ensuring government commitment; and providing support that is responsive to the circumstances in the country through a regional institution.

- (l) It is often more important that local communities have early warning systems than access to relief services that is often floated by development agencies at the onset of adverse environmental changes.
- (m) Finally, there is a concern that the efforts promoted by GEF and the UNFCCC on climate change may be seen by some as opportunities to capture financial resources instead of as a mechanism by which adaptation needs are understood, formulated, internalized and acted upon. To address this challenge, additional efforts need to be invested in awareness -creation among key policy makers and stakeholders.

The analysis has further highlighted the difficulty of distinguishing planned adaptation and development. In the broader sense, every single action could potentially be an unplanned adaptation; each has a series of impacts and it is often very difficult to decide whether on balance it has adaptation co-benefits or not. Our selection of unplanned adaptations is essentially subjective, based on our view on the meaning of planned adaptation.

An adaptation has been listed as planned if climate change has been considered during its planning (or more precisely, mentioned in the documentation available). However, it is noticeable that for many of the planned adaptations, climate change is only one of many drivers, and is often cross-cutting. Thus, very few, if any, of the adaptation actions are exclusively due to climate change.

On some occasions climate change is potentially being used to support an action that is desired for other reasons. Conversely, it is possible that climate change is the real driver, but that shorter-term benefits are being presented to obtain wider public support. Generally however, it appears that most current adaptations are justified on co-benefits and/or are 'no regret' options.

Adaptation to climate change in North Africa will require a mixed set of policies and programmes in public, private and other institutions. Government needs to be aware that every adaptation action taken could generate adaptive actions that may or may not be beneficial. Relying on climate change to act as a trigger for change in the private and public sector is not advisable, as institutions of all types seem to be driven by other pressures and drivers. Important drivers of climate change include national policies on climate change among others.

3.2 Mitigation

3.2.1 Energy sector

The wind and solar power represent the greatest percentage of the energy produced in the sub-region. So far, this is followed by waste incineration by both the municipal and industrial sources. Other energy sources, such as biomass, hydropower, and generation of electricity from dams and rivers representing a very small share of the renewable energy produced in the sub-region with exception for Morocco. Energy consumption has been increasing in the region, since the 1990s, and with it, the emissions of greenhouse gases - as one of the primary energy sources. However, the share of renewable energy is not expected to increase significantly, for the upcoming decades.

North Africa Region has very low levels of energy efficiency, and as a result, energy efficiency has become a high priority for most North African governments. The World Bank is conducting a study on Energy Efficiency in the Middle East and North Africa (MENA) to create a platform for policy dialogue on energy efficiency based on lessons from the international experiences and the specific needs of MENA countries.

For the past few years, the Middle East and North Africa (MENA) region through the Mediterranean Environmental Technical Assistance Program (METAP) conducted analytical work that revealed how poor solid waste management contributed to the cost of environmental degradation. With 0.5 percent of GDP, Morocco had one of the highest levels in the MENA region compared to 0.2 percent in Egypt and 0.1 percent in Algeria, Lebanon, Syria and Tunisia. Complementing the DPL, an additional carbon finance operation will allow access to Moroccan municipalities into the international carbon market. Being situated in the so-called Sunbelt of the earth, countries of the MENA Region are endowed with solar and wind energy that can contribute towards the future sustainable Renewable Energy (RE) Technologies, which provide a reliable and in many cases already a cost efficient way of harvesting energy offering solutions for problems North African countries are facing (sustainable water supply, rural electrification, telecommunication, shortage of power capacities, etc.).

3.2.1.1 Opportunities to increase Energy efficiency

Energy intensity—the ratio of energy use to GDP—has dropped dramatically nearly everywhere in the world. The OECD countries have experienced a steady decline in their energy intensity since the early 1970s. Only in the Middle East and North Africa (NA) has energy consumption been rising faster than GDP⁵. The region experienced a 14% rise in energy intensity between 1990 and 2005—a rate of nearly 1% per year. The region's energy intensity is now some 60% higher than that of OECD countries and 40% above the world's average. MENA is now the second most energy-intensive region in the world, after Eastern Europe and Central Asia. Some countries have done much better than others. Tunisia's energy intensity has experienced a steady decline since 1990.

All NA countries have an outstanding potential for solar energy. Using concentrating solar thermal power (CSP) plants to power sea water desalination on either by electricity or in

⁵ World Bank/ GDI database

combined generation with process steam to solve the water scarcity problem in NA is rather obvious approach. The market potential of solar powered seawater desalination between the year 2000 and 2050 has been described⁶. The CSP-desalination market has been assessed on an annual basis in a scenario that also considers other sources of water, the natural renewable surface- and groundwater resources, fossil groundwater, conventionally desalted water, re-use of waste water and measures to increase the efficiency of water distribution and end-use. The analysis confirms the economic potential of CSP-desalination to be large enough to solve the threatening MENA water crisis. On the other hand, it shows that the process to substitute the presently unsustainable over-use of groundwater by solar powered desalination will take until 2025 to become visible (Figure 1 and Table 1)

The total elimination of groundwater over-use will at the best take until 2035 to become accomplished. Over-use will increase from 44 billion cubic metres per year in 2000 to a maximum of 70 billion cubic metres per year in 2020, before it can be subsequently replaced by large amounts of freshwater from solar powered desalination.

There is strong evidence that in some regions the available groundwater resources may

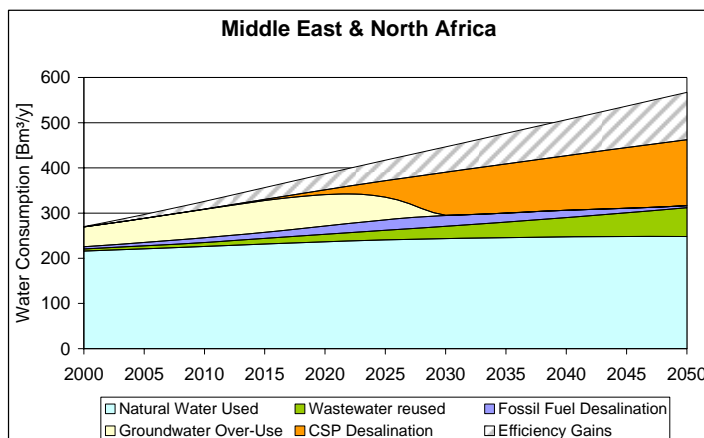


Figure 1. Water demand scenario for MENA until 2050 and coverage of demand by sustainable sources, by unsustainable sources and by solar desalination. (shaded: efficiency gains with respect to business as usual)
AQUA-CSP Study Report:
<http://www.dlr.de/tt/aqua-csp>

collapse under the increasing pressure before sustainability is achieved. In those cases, a strong pressure will also remain on fossil fuelled desalination, which will probably grow to five times the present capacity by 2030.

North Africa		2000	2010	2020	2030	2040	2050
Population	Million	141.9	167.3	192.8	214.5	231.9	244.3
Exploitable Water	Bm ³ /y	81.8	81.8	81.8	81.8	81.8	81.8
Sustainable Water Used	Bm ³ /y	72.8	77.5	83.5	90.5	98.7	108.6
Agricultural Demand	Bm ³ /y	80.4	92.1	103.0	111.4	117.6	120.9
Municipal Demand	Bm ³ /y	8.6	12.1	16.8	22.6	29.7	38.4
Industrial Demand	Bm ³ /y	5.4	7.6	10.6	14.3	18.8	24.3
Total Demand North Africa	Bm ³ /y	94.4	111.9	130.3	148.3	166.1	183.6
per capita Consumption	m ³ /cap/y	666	669	676	691	716	752
Wastewater Re-used	Bm ³ /y	3.2	5.6	9.2	14.5	21.7	31.3
CSP Desalination	Bm ³ /y	0.0	0.2	4.7	49.5	60.9	74.9
Minimum CSP Capacity	GW	0.0	0.1	2.0	21.2	26.1	32.1
Desalination by Fossil Fuel	Bm ³ /a	0.4	1.3	4.6	9.5	8.1	2.0
Groundwater Over-Use	Bm ³ /y	21.2	33.2	38.3	0.0	0.0	0.0
Natural Water Used	Bm ³ /y	69.6	71.6	73.5	74.9	75.5	75.3

Table 1: Aggregated data of North Africa countries of the AQUA-CSP scenario until 2050

For the past few years, the Middle East and North Africa (MENA) region through the Mediterranean North African countries have opportunities to evaluate trade-offs to improve energy efficiency, reduce emissions and increase urban environmental health outcomes by promoting energy sector reforms (power utility), reducing energy subsidies, improving urban mobility and switching to natural gas and abundant renewable energy (solar and wind energy). Moreover, they can increasingly tap into the carbon funding mechanism to curb the carbon-intensive trend (power plants, industries, wastewater treatment plants, landfill, green construction, reforestation where possible, etc.) as the forthcoming 2012 protocol could set more stringent emission reductions that could affect most North Africa countries especially the oil-producing ones

Wind, biomass and Concentrating Solar thermal Power (CSP) plants are already today competitive with fuel oil at 50 \$ / barrel⁷, and heading for competitiveness with natural gas and coal.

A study by the German Aerospace Center estimated that harnessing the sun's energy falling on just 6,000 square kilometers of desert in North Africa would supply energy equivalent to the entire oil production of the Middle East of 9 billion barrels a year. The German Aerospace Center⁸ plan envisages building solar thermal power plants of between 50 and 200 MW in size in different locations across North Africa (Box 1). Cables to transmit electricity from North Africa to Europe have already been built under the sea. The study calculated that solar thermal power plants could supply 68 percent of North Africa's as well as Europe's electricity by 2050. The main motivation and specific objectives for North Africa governments to improve energy efficiency include:

- Delivering electricity to isolated rural populations, based on village-scale mini-grids;
- Accelerating the integration of renewable energies (REs) on the national electricity grids with the objective of reaching grid stabilization and meeting supply-demand balance;
- Addressing the global approach of REs introduction (mainly solar) in the building sector in coherence with the energy efficiency policy;
- Desalinating sea water in order to increase water supply and availability for drinking and irrigation;
- Increasing agricultural water supply by pumping using solar, wind and biomass powered water pumps;

⁷ F. Trieb Concentrating Solar Power for Seawater Desalination. MENAREC 4, Damascus, Syria, June 2007

⁸ <http://www.renewableenergyworld.com> (October, 2009)

- Disseminating cooling systems for the food conservation, powered by renewable, in farms and fisheries; addressing, in the grid-connected urban and tourist areas. In addition,, the household and the community demand for lighting, food and drugs cooling, access to the communication networks, using solar home systems, small wind turbines, biogas and biomass power technologies. This could be achieved by creating joint ventures and other manufacturing, assembly and distribution/installation capabilities in institutions, so that they gain the maximum economic benefit from the initiative; promoting certification / standardization programmes for RE equipments.

These objectives will be reached by the implementation of innovative pilot projects to be considered a catalogue of best practices to be replicated, increasing the share of RE options available through already feasible RE power plants like wind farm, biomass co-combustion and hydro plants.

The economic growth trend is however vulnerable to the integrity of infrastructure and construction assets in case they are not built to withstand an increase in temperatures and/or natural events. Moreover, renewable energy generated by hydropower plants will be reduced especially in the Maghreb countries with a costly need to bridge the energy gap.

*Box 1: Workers build a thermo-solar power plant in Beni Mathar (Morocco) August 20, 2009.
Photo: Rafael Marchante*

A 400 billion euro (\$774 billion) plan to power Europe with Sahara sunlight is gaining momentum, using young technology in north African countries. Desertec, as the initiative is called, would be the world's most ambitious solar power project. Fields of mirrors in the desert would gather solar rays to boil water, turning turbines to electrify a new carbon-free network linking Europe, the Middle East and North Africa.

Its supporters, a dozen finance and industrial firms mostly from Germany, say it will keep Europe at the forefront of the fight against climate change and help North African and European economies to grow within greenhouse gas emission limits.

Others warn of numerous pitfalls, including Maghreb politics, Saharan sandstorms and the risk to desert populations if their water is diverted to clean dust off solar mirrors.

They say the concentrated solar power (CSP) technology behind Desertec involves greater costs and risks than the fast-growing patchwork of smaller-scale photovoltaic cell installations that generate most of Europe's solar energy today.

Desertec's founders are lured by the fact that more energy falls on the world's deserts in six hours than the world consumes in a year.

"The Sahara offers every advantage you want — proximity to Europe, virtually no population and more intense sunlight," said George Joffe, a research fellow and Maghreb expert at Cambridge



University, who is not affiliated to the plan. "It would be mad to pass up this opportunity." Proposed by the Club of Rome, an international group of experts that suggests solutions to global problems, Desertec became an industrial project in October 2009, when reinsurer Munich Re hosted its launch at its headquarters in the Bavarian capital.

Emissions Goals

Desertec officials say the Sahara could one day deliver 15% of Europe's electricity, but expect the plan to advance in small stages with completion not before 2050. Supporters of more established solar energy technology, such as photovoltaic cells, argue decentralized generation will prove more popular as falling prices make the heavy infrastructure needed for CSP unviable.

"Everyone Loves It"

CSP installations placed in the Sahara generate around 30% more power per area than in southern Spain, according to Morocco's renewable energy agency CDER.

"Desertec can help reduce emissions in Europe and foster economic and social development in northern Africa, so everyone loves this project," said Santiago Siage, head of Desertec consortium member Abengoa Solar.

Abengoa is developing installations combining CSP with combined-cycle gas power generation in Morocco and Algeria.

Southern countries that import most of their energy like Morocco, Tunisia and Jordan would also benefit from Desertec.

Morocco buys in 96 percent of its energy and subsidizes fuel to make it more affordable for the poor, a massive drain on state resources that could be used to fight poverty and bring services to isolated rural areas.

The Moroccan government says Desertec could solve Morocco's energy dependency and leave plenty of power for Europe. "Morocco doesn't have even 1% of Europe's energy consumption, so let's be realistic," said Said Mouline, the head of Morocco's renewable energy agency. "We would be generating enough power for us, and for export, for the next 100 years."

Exploitation?

Among hazards facing the scheme are the fact that Desertec would need tight coordination between governments to succeed, yet Maghreb states have tried and failed for two decades to integrate their economies and deepen political ties. Morocco says it has already identified sites to place the curved solar mirrors, not deep in the Sahara but in populated areas just north of the desert to ensure a supply of water to clean mirrors and cool turbines.

Algeria has the biggest chunk of desert and private Algerian firm Cevital has signed up for Desertec, but Africa's second-largest country is isolated and struggling to reform a Soviet-style economy after a brutal civil conflict in the 1990s. The government has tightened terms on inward investment and says it will only work with Desertec if it allows partnerships between Algerian and foreign firms and a transfer of technology.

"If these conditions are not met, we are not interested," said Algerian Energy and Mines Minister Chakib Khelil. "We don't want foreign companies exploiting solar energy from our land."

Source: Sustainabilitank.info 27th November, 2009

3.2.2 Reduced emissions from deforestation and forest degradation (REDD)

It is evident that more information from North Africa country Parties is required on what activities have been successful as well as what type of interventions have clearly contributed to developing the capacity needed. This will enable Parties to better understand best-practices in terms of effective capacity-building and to know that resources are being used where they are most needed. The emerging issues from the review show that:

- Lack of indicators which can be used to measure the progress carried out within the framework of adaptation to drought and the combat against desertification
- Difficulty of articulating in a concrete way different strategies (desertification, drought, climate, etc.)
- Actions undertaken to adapt to drought and combat desertification match urgent actions of adaptation to climate change which aim to improve management of water resources, forest, food security of affected countries

Need to facilitate the access to knowledge and information to decision-makers for a better mainstreaming of drought and land degradation issue in the development plans across different scales.

Widespread poor forest governance must be improved, with REDD providing strong incentives for building good governance of primary forests and other natural ecosystems at local, national and regional levels, including, *inter alia*:

- enhancing transparency of forest management by participating governments,
- enhancing transparency of national REDD processes through genuine multi-stakeholder engagement in national REDD groups,
- good fiscal governance,
- participatory law reform, and
- improved forest laws and enforcement of such laws
- setting-up and strengthening the observation and monitoring systems to help in developing the baselines and trends,
- improved research for development on how African forests will adapt to climate change
- building and strengthening the Africa's knowledge base at its capacity to integrate Sectoral and cross-sectoral aspects of climate change in particular in forestry .

REDD processes also should support existing forest governance multi-stakeholder processes, such as the Forest Law Enforcement Governance and Trade (FLEGT) initiatives.

3.2.3 Land use, land-use change and forestry (LULUCF)

Land use has generally been considered a local environmental issue, but it is becoming a force of global importance. Worldwide changes to forests, farmlands, waterways, and air are being driven by the need to provide food, fiber, water, and shelter to more than six billion people. Global croplands, pastures, plantations, and urban areas have expanded in recent decades, accompanied by large increases in energy, water, and fertilizer consumption, along with considerable losses of biodiversity. Such changes in land use have enabled humans to manage an increasing share of the planet's resources, but they also potentially undermine the capacity of ecosystems to sustain food production, maintain freshwater and forest resources, regulate climate and air quality, and ameliorate infectious diseases. The challenge lies in managing trade-offs between immediate human needs and maintaining the capacity of the biosphere to provide goods and services in the long term.

Desertification is induced by several factors, primarily anthropogenic causes. The primary reasons for desertification are overgrazing, over-cultivation, increased fire frequency, water impoundment, deforestation, overdrafting of groundwater, increased soil salinity, and global climate change. Similarly, land degradation is a central concern of several international initiatives such as FAO, UNDP, GOF/GOLD, the IGBP Global Land Project, and the ESSP GECAFS project, and underpins various research challenges to come up with suitable sustainable mitigation alternatives. At the local level, individuals and governments can temporarily forestall desertification. Sand fences are used throughout oases, as the primary source of emissions in Africa, this represents one of the key areas for mitigation action in the continent, which includes best practices to enhance carbon sequestration and reduced emissions. In contrast, this is not the case for North Africa countries. In the land use sector, there are few examples of planned adaptation to climate change across the Region. There exist a small number of *ad hoc* examples of farmers and voluntary initiatives to improve farming practices, largely driven by sustainable development policy at the local and regional levels. The information on the impacts of climate change is at best uncertain and there is limited representation of farmers in important decision making processes. Information about the impacts of climate change is not sufficient incentive to promote concrete adaptation

The world has become accustomed to grim depictions of the drylands as hopeless zones of perennial misery, hunger and conflict, where tragedy and chaos grab attention. Meanwhile, much progress has been made and some of the success stories that deserve greater recognition include:

- Cooperative management by thousands of herders to restore degraded rangelands across a three million hectare area in eastern Morocco;
- The creation of community-based organizations and negotiated action plans to improve land management in the degradation-prone drylands of the Mashreq and Maghreb countries of North Africa and the Middle East.

Rehabilitation of severely degraded rangelands in eastern Morocco during the 1990s was achieved by establishing clan-based cooperatives that encompassed 8,250 herders over a 3 million ha area. They were provided with 30 kg of barley per year as compensation for setting aside 450,000 ha for recuperation for two years. The set-aside vegetation quickly recovered and its productivity jumped from 150 to 800 kg / ha of dry matter per year, a gain worth 50% more than the cost that was set-aside. Controlled rotational grazing now generates enough benefits that the herders pay grazing fees to their cooperatives.

The Mashreq and Maghreb project linked the Mashreq (Jordan, Syria, Lebanon, and Iraq) and Maghreb (Morocco, Algeria, Tunisia, and Libya) countries to combat desertification. Promising technologies were identified, but partners soon realized that policies and institutions also needed to be supportive for their implementation. The project catalyzed the creation of community-based organizations to develop 'negotiated action plans' that set standards for land management in their domains. They also function as communication and advocacy channels to promote policy and institutional reforms affecting property rights, land and water management, marketing and credit.

To this end, there is a need to develop two major components:

The first component, use of remote sensing in detecting and quantifying land-cover and land-use changes in rapidly changing regions in North Africa “hot spots” with an emphasis on i) mountainous regions, which to date have received less attention; and ii) agricultural or urban land use: for example, addressing the loss of forest or woodlands due to agricultural expansion, the loss of agricultural land by urban and peri-urban growth, the abandonment of agricultural land, or changing agricultural practices (e.g. intensification, cropping systems, irrigation, mechanization or shifts between arable farming and ranching), which result from economic, demographic, policy or climate changes. Regional scale studies or synthesis of several local scale studies are preferred to individual local scale studies.

The second component, the drivers is directed at explaining and attributing land-cover and land-use changes in agricultural or urban areas of the sub-region, in terms of their underlying causes, such as climate variability or change, changing markets, economic development, population dynamics or changes in government policies, and examining the implications of the changes in terms of their impacts, for example on the vulnerability, impacts, and adaptation of the land use or associated social systems.

3.2.4 Using and maximizing opportunities from the international carbon market

The institutional frameworks for the CDM market in North Africa are now in place, even though personnel capacity, competency and expertise at the agencies responsible are in most cases still in need of improvement. With only eleven registered CDM projects so far, North Africa has not acquired a clear profile as a CDM host. Although the region is considered a forerunner in Africa when it comes to energy and environment policy, no explicit priority seems to have been attached to CDM as yet (Algeria and Libya have no registered CDM project). With the help of international organisations and bilateral cooperation, however, progress is likely in capacity improvement in NA during the next few years and it can be expected to play a more active role on the international CDM market in future.

Private sector financing for projects in North Africa is relatively low. Businesses seeking Carbon Emission Reduction (CER) credits through CDM projects are generally not turning to North Africa. In fact, UNFCCC researchers report that about 3% of the 1,000 plus CDM projects globally are in Africa.

3.2.4.1 CDM Investment climate index (CDI ICI): regional comparison

The CDM ICI measures the investment climate for CDM projects as illustrated in Table 2. It can range between 100 points (highest) and 0 points (lowest). Altogether, the climate is rated as 'good' in Tunisia. The country ranks second in Africa (Rank 18 out of 150). South Africa ranks top due to a slow but steady increase in the number of projects registered at the CDM Executive Board (EB) a United Nations (UN) body responsible for the international approval of CDM projects over the last three years. So far, only two projects have been registered in Tunisia since 2006, four in Egypt and five in Morocco.

Rank	Country	CDM ICI (max. 100 points)	Regional classification
1	South Africa	78.0	Good climate
2.	Tunisia	77.5	Good climate
3.	Morocco	74.5	Satisfactory climate
4.	Egypt	69.2	Satisfactory climate
....
54	Somalia	3.9	Unsatisfactory climate

Table 2: CDM investment climate index (CDM ICI), Africa - July 2009 (excerpt)

Source: DEG - Deutsche Investitions - und Entwicklungsgesellschaft mbH
(For method of calculation method see www.kyoto-coaching-cologne.net)

Since the last issue of the CDM Market Brief in mid-2006, Tunisia has made hardly any progress in registering new projects at EB. The two projects that were in the validation phase at that time were registered at the EB at the end of 2006. By May 2009, only one other project was undergoing the validation phase, thus Tunisia is lagging behind its own ambitious plans of 2006, but also records fewer registered projects than the North African CDM host countries Egypt and Morocco.

The reason for the small number of registered projects is not, however, the lack of potential for CDM projects. Projections estimate that Tunisia will emit greenhouse gases amounting to 55 million t of CO₂e in 2010, increasing to 79 million t of CO₂e by 2020. The largest prospective reductions are located in the energy sector, in solid waste management and industrial production processes.

Tunisia itself has drawn up an extensive portfolio of prospective CDM projects. It comprises of 139 projects for the period 2008 to 2012 and could result in the avoidance of altogether about 39 million t of CO₂e by 2012. Almost 80% of the potential emission cutbacks by 2012 are in the energy sector (energy efficiency, renewable energies, fuel switch - substituting oil with gas - and greenhouse gas use to generate energy), industrial processes (chemicals and cement industry) and in solid waste management.

The state utility companies (offices), primarily the power supplier ONE, which have been the dominant players in the sector till now, show satisfaction with the CDM in the country. This tells us little about the conditions for private investors; however, experience with the only registered private project so far, has also been good. The extensive and well-diversified portfolio that has been built up with international assistance in a short time is a measure of the favourable CDM conditions in Morocco. Moreover, the Moroccan designated national authority (DNA) is rated as highly transparent.

The establishment of CDM is opportune for Morocco. High international energy prices and low fossil reserves call for the rapid development of renewable energy and higher efficiency in energy use. There are also large investment needs in solid waste and wastewater management. Besides the 'classical' project segments, there are also opportunities in afforestation measures to combat desertification in the country.

A major reason for the thin progress made on the CDM market is that it is still not accorded any high policy priority. There is, for example, still no legal and fiscal framework for the transfer of CO2 certificates. Measures needed to promote the study on CDM progress in North Africa identified some weak points in the institutional framework. It found that the demarcation between the role of the DNA and the Ministry of Environment was not clear enough, the DNA secretariat was understaffed and the Executive Committee was short of experts. The project evaluation procedure still lacked transparency and the administrative operations needed improvement.

3.3 Supporting and enabling measures

Three categories of supporting and enabling measures have been identified to support Africa's efforts to adapt to and mitigate climate change. These should form an integrated package of support tailored to each climate change intervention.

3.3.1. Capacity-building, initiatives and activities in North Africa

Capacity-building measures include the following:

- a) To enable human resource development through focused training, mentoring and learning-by-doing approaches, among other measures;
- b) To empower relevant institutions at various levels;
- c) To enhance observation, research and knowledge management;
- d) To strengthen communication, education and awareness-raising at all levels, especially at the local and community levels;
- e) To strengthen and use the regional networks of information and knowledge-sharing;
- f) To develop tools, methods and technologies and support their application;
- g) To encourage and strengthen participatory and integrated approaches in planning and decision-making, including the meaningful participation of civil society;
- h) To share experiences, information and best practices of African countries;
- i) To assess, strengthen and mobilize the capacities of existing relevant facilities and institutions in Africa.

North African governments have already put in place institutional arrangements at the national and local levels. Training is developed in this domain, where training programmes for professionals and technicians are conducted and promoted by institutions at some levels or in specific thematics. However, criteria have not yet been set to monitor the benefit of the society from training, awareness and education and signs of cultural changes. Crisis management focal points and or/entities also have been established in all governorates (Local level), ministries, agencies and institutions.

Although, training is offered to the institutions at local level, research, data collection and dissemination activities remain central. The top down approach is currently applied to achieve the central-local, central-local-civil society relations. Resource limitation slow down the process of the development and strengthening of institutions, mechanisms and capacities at all levels.

Currently, several adaptation-relevant initiatives and programs are ongoing or proposed for the near future. They have contributed or are expected to contribute to building adaptation capacity in North Africa. The list below is not exhaustive but it is meant to shed the light on some of the important adaptation relevant initiatives in North Africa

The Concrete planned or ongoing adaptation projects include:

3.3.1.1 Programmes

Community-based Adaptation (CBA) Programme, Global, Morocco

This project aims at: (i) developing a framework, including new knowledge and capacity, that spans the local to the intergovernmental levels to respond to unique community-based adaptation needs; (ii) identifying and financing diverse community-based adaptation projects in a number of selected countries; and (iii) capturing and disseminating lessons learned at the community level to all stakeholders, including governments. This project is to be funded through GEF's SPA and UNDP as the implementing agency.

4.3.1.2 Regional organizations, groups and networks

- Climate Change Adaptation Support Programme for Action-Research and Capacity Development in Africa (CCAA) programme:

Currently, the International Development Research Council (IDRC), Canada, is partnering with the Department for International Development (DFID) in the UK to fund a five-year, \$65 million CAD Climate Change Adaptation Support Programme for Action-Research and Capacity Development in Africa (CCAA). Its aim is to support African countries in their efforts to address vulnerability, particularly of the poor, to climate change. Building on current activities and experience, the CCAA programme will strengthen efforts to establish and maintain a skilled body of expertise in Africa to support efforts to cope with climate variability and change with a focus on the poor. The programme objectives are:

- To fund and support research to reduce the uncertainty associated with climate change and variability;
- To strengthen the capacity of African scientists, Africa's research organizations, governments, civil society organizations, and international bodies to work collaboratively in assessing vulnerabilities to climate and other stresses, and supporting adaptation by African people, particularly the poor;
- To support adaptation by rural and urban people by supporting research that contributes to a more inclusive policy-making process; and
- To add value to existing adaptation initiatives.

- The New Partnership for Africa's Development (NEPAD) has an African-led strategy for sustainable development and poverty reduction in Africa. African leaders are looking for support from the international community to achieve these goals. NEPAD is a long-term agenda for Africa adopted as a programme of the Africa Union. The NEPAD Secretariat is developing an implementation plan and building linkages with existing regional organisations such as the Economic Community of West African States (ECOWAS) and

Southern African Development Community (SADC), IGAD and UMA. The Secretariat has engaged with other African organisations, such as the UN Economic Commission for Africa (ECA) and the Africa Development Bank (AfDB), to elaborate proposals in support of NEPAD priorities

- **The African Climate Change Fellowship Program (ACCFP)** offers experiential learning, education, research and training opportunities to African professionals, researchers and graduate students to build their capabilities for advancing and applying knowledge for climate change adaptation in Africa. Participating Fellows receive small grants that enable them to undertake Policy, Post- Doctoral, Doctoral or Teaching Fellowships. The Fellows visit other institutions – Host Institutions – to implement a project of their own design that enhances their understanding of climate risks, vulnerabilities and adaptation strategies, assesses current practices for designing and implementing adaptation projects and/or promotes integration of adaptation with planning, policy and decision-making.

The ACCFP is jointly administered by START, the Institute of Resource Assessment (IRA) of the University of Dar es Salaam and the African Academy of Sciences (AAS), with generous financial support from the Climate Change Adaptation in Africa (CCAA) Program. The CCAA is funded by IDRC Canada and UK DFID.

3.3.1.3. Institutions and centers

-**The Regional Centre for Space Science and Technology Education in Africa (CRASTE-LF)** established in 1998 in Rabat, Morocco, is one of the constituents of the training network set up by the U.N. It is a training and scientific animation institution affiliated with the U.N with the objective of promoting the use of space science and technology by strengthening local competence. Its mission is to organize courses, training, seminars, workshops, and expert technical meetings to improve the competence of specialists and decision-makers and to keep them informed about progress in space science and technology applications. They also assist in the development of a local indigenous capability in space science and technology, to supply consultative services for State members and regional institutions, to collect and diffuse information concerning space, and to support any activity that seeks to increase scientific development in the region

- **Sahara and Sahel Observatory (OSS)** : During the past ten years or so, OSS has initiated a work programme in arid, semi arid and sub-humid areas in North, West and East Africa including long-term observations and networks focusing on land degradation issues. A series of biophysical indicators have been identified and collected. Each of the three sub-regions (North Africa, Sahelian Africa and Eastern Africa) needs to come up with a minimum set of indicators including biophysical, socio-economic issues that helps to assess their vulnerabilities to climate change and thus identify potential action for adaptation. In North Africa, the Union of Maghreb Arab organisation has a mandate to develop policies related to all environmental issues within member countries.

OSS has been identified (Addis Ababa, Ethiopia, 1-3 September, 2009) as the focal institution for the North-African region to help implement a database on climate in Africa,

which will be hosted at the African Climate Policy Centre (ACPC). The OSS and the Economic Commission for Africa (ECA) are planning to sign a Memorandum of Understanding to define the respective roles of the two institutions.

The OSS participated in the consultative meeting organized by the ECA whose objective was to define concrete measures to support and or sustain the ClimDev programme and to help it acquire reliable data and information. The ClimDev programme is an initiative of the Commission of the African Union, the ECA and the African Development Bank, whereas the ACPC has been created to implement it.

- **Climate Prediction and Application Center (ICPAC)** was established in October 2003 as a follow-up for a number of projects through USAID/REDSO that aims to improve the technical capacity of producers and users of climatic information, in order to enhance the input to and use of climate monitoring and forecasting products; developing an improved, proactive, timely, broad-based system of information and product dissemination and feedback, at both sub-regional and national scales through national partners; and expanding the knowledge base within the sub-region in order to facilitate informed decision making, through a better understanding of climatic and climate-related processes, enhanced research and development, and a well managed reference archive of data and information products.

- **Regional Euro-Mediterranean Programme for the Environment (REMPE)**

The SMAP Clearing House - an Internet Portal to navigate the Mediterranean "Sea" of Information on the Environment (including North Africa). The Clearing House aims at providing the REMPE community with a tool for capturing, for each SMAP priority area, the current situation in terms of: development of the environmental projects; environmental information at national and regional levels; trends and directions at stake for environmental management; policies and strategies; approaches and methodologies; and instruments and practices

- **The Mediterranean Renewable Energy Centre (MEDREC):**

MEDREC is a centre of excellence based in Tunis for training, information dissemination, networking and development of pilot projects in the field of renewable energies, and represents the operational tool and reference point for the implementation of MedREP in the region. It was established in Tunis on January 26, 2004, by an agreement among the Italian Ministry for the Environment and Territory, the Tunisian Ministry for Industry and Energy (TMIE) and *l'Agence Nationale des Energies Renouvelables (ANER)*.

The centre focuses on wind and solar energy; however, others sectors related to mini-hydro, geothermal, biomass and fuel-cells are under consideration. The Tunis Centre is part of the Global Network on Energy for Sustainable Development, a UNEP facilitated knowledge network of developing world Centres of Excellence and network partners, renowned for their activities on energy, development and environment issues. The objectives of the Centre are the deployment of financing sources and mechanisms, options for the financial support of renewable energies (REs) projects; the development of regional competencies in the field of REs; the dissemination of information in different sectors; the

development of pilot projects and transfer of technology in the field of REs; the implementation of the efficiency of REs systems.

The Centre is managed by a technical director designated by ANER and assisted by two deputy directors, one designated by IMET and the other by OME.

The technical staff is composed of nine experts: five experts, one for each of the North African countries, namely Algeria, Egypt, Libya, Morocco, and Tunisia; two experts each from Italy and UNEP.

- Regional Observatories:

16 Ongoing Moroccan observatories work in collaboration with existing institutions. to support capacity building for regional and national institutions in climate and sea-level change data generation and collation, climate projection and impacts assessment modeling, vulnerability assessments, and adaptation approaches, improving the existing public outreach and education building programs.

3.3.2 Finance

There is a need:

- a) For equity in the allocation of funds based on need, including the use of vulnerability criteria in resource allocation decision-making;
- b) To develop effective systems to ensure transparency and accountability in the use of funds mobilized for climate change;
- c) For funding to be new, additional to existing development funds and reliable in the long term.

Both bilateral and multilateral donors provide a variety of finance facilities for projects on mitigation and adaptation to climate change in North Africa. Available funding for adaptation activities include:

(a) The Global Environment Facility (GEF) Trust Fund

The GEF, as an entity entrusted to operate the financial mechanism of the UNFCCC, established the Strategic Priority on Adaptation (SPA) under its Trust Fund. The objective of the SPA is to reduce vulnerability and to increase adaptive capacity to the adverse effects of climate change in the focal areas in which the GEF works. The SPA supports pilot and demonstration projects that address local adaptation while also generating the global environmental benefits;

(b) The Special Climate Change Fund (SCCF)

The SCCF aims at supporting activities in the following areas: (i) adaptation, (ii) technology transfer, (iii) energy, transport, industry, agriculture, forestry and waste management, and (iv) economic diversification. Adaptation activities to address the adverse effects of climate change have top priority for funding under the SCCF;

(c) The Adaptation Fund under the Kyoto Protocol

The Kyoto Protocol Adaptation Fund will be financed from the share of proceeds of the clean development mechanism (CDM) and other sources; and

(d) Funds under other Multilateral Environmental Agreements (MEAs)

Some funding is also available under other MEAs whose areas of work could be synergetic with adaptation, including the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) and the Ramsar convention on the conservation of wetland resources.

The World Bank Group is working with the Global Environment Facility (GEF), the Trust Fund for Environmentally & Socially Sustainable Development (TFESSD), the Strategic Climate Fund (SCF), the Clean Technology Fund (CTF), the Global Facility for Disaster Reduction and Recovery (GFDRR), the Japan Policy and Human Resources Development Fund (PHRD), the Norwegian Trust Fund for Private Sector and Infrastructure (NTF-PSI), and the Bank-Netherlands Partnership Program (BNPP) to tackle the adaptation and mitigation issues in MENA

The Bank's strategic approach addresses climate-induced challenges in North Africa by:

- promoting policies and investments for better water management and agricultural diversification
- increasing support for developing energy efficiency and renewable energy resources and for power sector reform
- developing new analytical services to better evaluate the magnitude and distribution of climate impact
- lending in support of technologies for both mitigation and adaptation
- promoting innovative mechanisms to spread climate risks through, for example, insurance

GFDRR provides financial and technical assistance to disaster-prone low and middle-income countries as well as small island countries and fragile states at risk from recurring multiple natural hazards. According to UNDP, at least six developing countries are hit by between two and eight disasters every year.

GFDRR has supported the North African Disaster Risk Mitigation and Preparedness Initiative, which includes a vulnerability assessment of SEE countries; a feasibility study for the development of an integrated weather forecasting and flood early warning system; and disaster risk insurance.

In Morocco, GFDRR is helping to build local capacity for disaster risk management through activities such as risk mapping, building code reviews, and an index-based flood insurance pilot project in support of the Government's disaster reduction program. The growing momentum for disaster prevention and mitigation is fostering intra-regional cooperation in the Middle East and North Africa. Disaster risk assessments are scheduled for Algeria.

With GFDRR support, a growing number of universities, academic institutions, and scientific organizations are promoting disaster risk reduction education, training, research, and knowledge sharing.

The World Bank is supporting studies as well as projects to enhance the region's resilience to the impacts of climate change in the key sectors. Examples include: development of localized climate scenarios for the MENA region; evaluation of climate change impacts on water and agriculture in Morocco and on oak forest ecosystem in Tunisia.

On mitigation, the Bank is promoting, with support from the Clean Technology Fund, a number of initiatives aimed at reducing the carbon footprint of the energy and transport sectors in Egypt and Tunisia. The Bank is also helping develop the region's huge potential in renewable energy resources.

The World Bank is actively helping the region's countries explore Clean Development Mechanism opportunities. With 11 carbon offset projects, including four signed emission reductions purchase agreements, the Bank is facilitating emissions reduction efforts and contributing to low carbon development in the region. The Bank is also helping 4 countries enhance their capacity to engage in carbon finance. These technical assistance programs can help scale up carbon finance across sectors and increase its impact on economic development.

Noting that Africa is expected to experience higher than average warming and decreased rainfall in most areas significantly impacting development planning, the African Union has urged the African Development Bank (AfDB) as well as the private sector to take climate impacts into consideration. In April 2009, the AfDB approved a Climate Risk Management and Adaptation Strategy. The strategy focuses on "climate proofing" investments, policy, legal and regulatory reform, and education and capacity building. AfDB plans to leverage private sector financing to help advance the strategy, which will be integrated into all bank operations.

3.3.3. Technology development and transfer

The development and transfer of technology are critical to the achievement of both adaptation and mitigation programmes in Africa. Key areas of work in the field of technology include:

- (a) Enhancing technology development and transfer, including hard technologies (e.g., drip irrigation, water harvesting, drought-resistant crop varieties, renewable energy technologies, building technologies, etc.) and soft technologies (e.g., knowledge, systems, procedures, best practices);
- (b) Addressing technology transfer barriers, including rules of trade tariffs, intellectual property right-barriers and technical trade barriers (standards, ecolabelling);
- (c) Enhancing and supporting the research and development capacity in African countries to foster the development and local manufacture of cleaner mitigation and adaptation technologies.

Analysis of Technology Transfer in CDM Projects

Although the Clean Development Mechanism (CDM) does not have an explicit technology transfer mandate, it may contribute to technology transfer by financing emission reduction projects using technologies currently not available in the host countries. We analyze the claims of technology transfer made by project participants in the project design documents for 28 registered and proposed CDM projects for November 2009 (Egypt, 14; Morocco, 11, Tunisia, 3).

The definition of “technology transfer” is not provided to project participants, so each project is free to make its own interpretation of “technology transfer”. However, from the claims it is clear that project participants overwhelmingly interpret technology transfer as meaning the use of equipment or knowledge not previously available in the host country for the CDM project.

The statements made by project participants in their PDDs indicate that in most cases technologies are being imported because they are lacking domestically. In some cases, a project may import new equipment or knowledge because it is more efficient, more reliable, or better in other respects than a similar technology already available domestically. It is difficult to know how common these cases are since the motivations for importing the technology are not always included in the PDD, but the impression is that the number is small.

Technology transfer is very heterogeneous across project types. Technology transfer is claimed for a higher share of Agriculture, Landfill gas, N₂O, HFC and Wind projects, and for a lower share of Biomass energy, Cement, Fugitive and Transportation projects. Technology transfer is more common for projects that involve foreign participants than for unilateral projects. Also, it important to note that most projects that claim technology transfer involve transfers of both equipment and knowledge.

As more projects of a given type are implemented in a country the rate of technology transfer declines. Declining rates of technology transfer for the most common project types – EE Own generation, N₂O and Wind and Biomass energy and Landfill gas in Morocco and Egypt –contribute to the low rates of technology transfer for those countries. Those results also indicate a transfer of technology beyond the individual CDM projects that allows later projects to rely more on local knowledge and equipment. The technology transferred mostly originates from, Germany, France, Great Britain. UK., Japan Austria Spain, Canada, Denmark and Switzerland.

The POSEIDON Project: Technology Transfer and Adaptation: the Trance Mediterranean Renewable Energy Collaboration and regional energy structure (TREC), an initiative of Club of Rome, launched in 2004 a Project Study “Concentrating Solar Power for Mediterranean Region (MED-CSP)”. This programme aims at planning, optimizing, designing and building a first plant for solar electricity generation and seawater desalination (POSEIDON), based on concentrating solar thermal power (CSP) technology in a MENA coastal area with arid or semi-arid climate, and to prepare for the replication of this concept in the MENA region and world wide. Its objectives include:

The overall task of IFEED in this project is the adaptation of the FAO concept of Integrated Energy Farming in MED-CSP project for rural and agriculture development in Mediterranean region as well as the identification of revenues and demand structures in agriculture and the rural sector.

Agricultural production can emerge on not yet useable areas through economical sea water desalination and by processing the waste heat of the plants. This means a double CO₂ - drop through avoiding the combustion of fossilized raw materials and the addition of biomass and food production. New habitats and prospects are created for the local population. The economy receives enormous potential for a wide population group in the technology transfer

There could be different delivery mechanisms for technological transfer, such as transfer of equity in a company possessing the desired technology, license agreements with owners of the technology, purchase of equipment containing the technology, paying directly for the know-how involved, hiring personnel who possess the knowledge about the technology, etc., but in many cases, one of the major barriers is the transfer of protected or previously classified intellectual property in particular in competitive areas.

Good governance of the process is necessary to identify early on and act upon market failures, such as prohibitive cost of technology information, inefficiency of capital markets, prohibitive costs of entering a new market and market inertia due to lock-in of existing technologies.

Enhanced international cooperation is crucial to achieve the “energy revolution”. In competitive areas in particular, major hurdle to international cooperation remains the issue of intellectual property rights (IPR). With regards to pre-competitive areas, crosscutting issues such as resources mapping and standards could be first priority for cooperation.

4. INDICATIVE RECOMMENDATIONS

4.1 Key message

Joint discussion and efforts to reduce greenhouse gas emissions while helping countries plan and undertake adaptation are already taking place. The immediacy of the climate change problem has to date forced countries, such as those in the arid regions of Africa, into “reactive adaptation”, instead of “planned adaptation”. Climate change now provides a unique opportunity for the international community to question the modes of development currently in practice and to make decisions on new sustainable development pathways for the future. The key development sectors of the economy are at risk, with grave consequences for life on earth if climate change is not addressed as a matter of urgency, hence, action must start now and by involving all relevant actors.

4.2 Barriers to Integrating Adaptation and Development

North Africa is increasingly realizing the importance of pursuing a social development track that helps communities adapt to changes in their environment. This can be called “climate-resilient development.” However, integrating climate concerns with national development priorities can be difficult in practice. In North Africa, climate programs currently do not directly address basic human development needs such as AIDS prevention, employment, health care, and housing. Adaptation planning must address these social issues if it is to be successful; otherwise, the possibilities of sidelining adaptation efforts are evident.

4.3 North African Institutional Leadership on Climate Change

The UNFCCC’s negotiation and implementation process has led to the emergence of a core set of skills and co-ordination mechanisms which have contributed to the emergence of African action on climate change. The wide-ranging nature of the processes under the convention has brought together a diversity of actors, from government to business, and civil society to the research community. Unfortunately, the capacity and knowledge that has been generated is broad and thin, rather than deep and embedded, and a little digging betrays the lack of real political commitment and leadership within African countries.

Countries now have the capacity to participate in UNFCCC processes such as CoP meetings, IPCC working groups and research projects. There is however room for better coordination and incorporation into national or sectoral policies. At the national level, there is evidence of the isolation of some institutions, poor information flows, lack of dissemination of research and international negotiation outcomes. The same goes for GEF focal points in various countries; their efficiency is hampered by under-representation and the lack of real content in their work programmes. Indeed, some focal points lead only a nominal existence, they do very little to distribute information on the work and criteria of the GEF and have little impact on climate change policies and projects. As a consequence, there is a lack of coherent policymaking on climate change. If the African voice is to be strengthened at the international stage, these must be addressed.

Planning for adaptation cannot take place forever: there is an immediate need to move from preparation and planning to focus more on practical adaptation actions, with the information available, even though there may be gaps, it is vital to move very fast into to concrete actions

Implementation of adaptation activities must be done in such a way as to involve various levels (local, national, regional and international), recognizing the distinct role each has to play. New partnerships need to be built through solidarity around the central concerns of various regions and countries, which vary greatly. Adaptation strategies must, at a minimum, aim to:

- improve short-term (disaster relief) responses to extreme events while simultaneously reinforcing the adaptive capacity of communities to deal with the impacts of climate change in the long-term;
- improve both economic and ecosystem resilience, noting that mal-adaptation and low levels of adaptive capacity for responding to climate stresses has historically been

associated with significant economic losses in many regions as well as with irreversible damages to our one and only earth; and

- strengthen the resilience of communities to short term climate variability and climate change risks while promoting integrated and balanced long term development. Faced with scarce resources, governments need to address the lack of adequate human and institutional capacity to deal with climate change uncertainty. They must provide proper governance, political leadership, and the will and guidance to minimise conflicts between competing *Agenda* and difficulties in working with non-state bodies and local communities.

4.4 Types of uncertainty

The best-known type of uncertainty is a lack of knowledge because of the limited availability and the variability of data. An equally important but often less recognized type of uncertainty is in the understanding of the system itself, not only its historical trends but also the system elements and interactions, including nonlinearities, feedback loops, and delays, that generate those trends. This applies in particular to socioeconomic systems and human behavior in those cases in which there is more than one possible interpretation of the same phenomenon. Also, the understanding of ecosystems is not as well developed as that of hydrological systems, the home turf of many scientists and practitioners working in water management. Furthermore, integrated adaptation requires an understanding of the full complexity of coupled human-environment-technology systems. Another source of uncertainty inherent in system behavior rather than in the knowledge about it is the unpredictability of certain factors. In loosely coupled systems, the trajectory a system follows depends greatly on the original conditions around which it self-organizes. One prominent example is climate change and corresponding changes in nature and the likelihood of extreme events.

University education in North Africa is not providing an adequate education to meet the challenges of water management. The dominant educational model values specialization, with the result that water is taught as the domain of a single discipline (climatology, hydrology, civil engineering, and economics). Formal education in other departments is limited. Educational institutions in North Africa, stretching from primary school until PhD, should work together on the design of a 'educational pipeline' for the theme 'Global Change'.

Developing the pipeline means, in the first place, aligning and bridging the educational levels. In this pilot, academic institutions will be challenged to match competences profiles, educational content and teaching methodology match with those of their counterparts. In this exercise, 'Climate Change' acts as a common theme and set the framework for the fine-tuning of the curriculum of each level. In a parallel development, the pipeline must provide to teachers a common pool of enterprises in the region, which are interested in cooperation with the educational system as well as being relevant societal partners in water. So the pipeline will also create the opportunity to build a network of different water

partners in the same region where spin-off, incubation and emulation around the theme 'water' can occur.

The pipeline will concur in developing a guideline for "Global change" education for the future, meaning that the concept and principles of a sustainable development are imbedded in the pipeline. This innovative concept of education is problem-oriented, linked to real practical issues owned by stakeholders outside of the school. Students are 'learning by doing' and interdisciplinary on innovative theme such as Climate change.

4.5 Policy Recommendations and Actions: putting Knowledge into Practice

4.5.1 Use of *this study findings*

To strengthen **public awareness** about adaptation to climate change to:

- Inform decision makers
- Minimize uncertainty through scientific knowledge
 - Enhance communication and capitalization of the best practices to pass on the knowledge and existing methods
 - Improve visibility of CSOs activities on CCD
 - Put in place frameworks of dialogue and information exchange decentralized at local level
 - Federate more an important number of actors, including the local populations, to reinforce cooperation and harmonization of interventions
 - Strengthen partnership with institutions working in the fields of drought and widen Drynet activities in other affected countries
 - Put information at States disposal for a better consideration of NGO / CBOs actions in the UNCCD national reports

4.5.2 Social dimensions

To understand the social dimensions of climate change adaptation, and related elements of risk management; resilience; and social protection, through:

- Focus on local level impacts and responses;
- Engagement of vulnerable and disadvantaged groups to understand adaptation in particular contexts and groups;
- Institutional and policy reform challenges;
- Assessment of existing adaptive capacity;
- Building on existing adaptive responses

4.5.3 Creation of synergies

Synergies must be enhanced among the multilateral environmental agreements (MEA) agreements, MDGs and other regional initiatives such as NEPAD. Climate change adaptation must also be integrated into development strategies and plans. To do so, the following steps should be taken:

At the local and national scale, it will be important to improve knowledge and awareness of the most vulnerable communities; improve downscaling of climate model; to adapt early

warning systems to smaller scales; integrate climate change issues into social networks, respecting social and cultural values; and strengthen cooperation between national authorities in order to transfer best practises, clean technologies and lessons learnt related to national adaptation programmes and projects. At the regional scale, it is important to identify and improve policies and institutions relevant to climate change, and identify trans-boundary issues and economies of scale for natural resources and energy management.

4.5.4 Disaster management and risk reduction

Substantial actions have been considered to integrate disaster management and risk reduction into sustainable development policies, planning and programmes. However, this needs further development and efforts to achieve the effective integration and emphasize the concepts of disaster prevention, mitigation, preparedness and vulnerability reduction. Challenges encountered while implementing the national vision and actions are summarized as follows:

- Ensuring the sustainability of the set national agenda and policy to adopt the DRR principle in accordance to Hyogo Framework for Action (HFA), and to keep the started momentum and the resulting institutional setting, capacity building and technical assistance provided to the local level.
- The scarcity and limitation of funds and resources used for the implementation of development programmes. Resources are not only related to funding issues but also imply a lack of capacities of trained human resources and modern technology at all levels for planning and subsequent execution of DRR policies and programmes.

4.5.5 A funding mechanism

A funding mechanism is needed to facilitate and finance adaptation programmes is needed. The adaptation funds need to be operationalized with immediate effect. Fighting climate change requires a two-tier attack, noting that adaptation is imperative, but an eventual 80% reduction in GHGs is crucial to stabilize the atmosphere for current and future generations. Africa's contribution to support global carbon emissions needs to be recognized and compensated accordingly. This is a case of environmental justice and should be addressed responsibly by all actors and stakeholders.

4.5.6 Capacity building initiatives

The capacity building and technology transfer are needed to help Africa develop energy efficient systems that minimise global green house gas emissions. In the process of such collaboration, both developing countries and North African institutions and individuals will improve their capacities to do assessments and understand climate change better, to minimise social, environmental and economic losses.

Countries in the region, regional and international organizations, private sector and NGOs, have to put more emphasis on developing and implementing educational, and public awareness programmes on renewable energy and energy efficiency technologies in the NA regions

Concreted global action to promote renewable energy and energy efficiency is needed. Regional and global cooperation on the optimization of national support schemes,

exchange of best practices, “know-how”, and technical progress through bilateral and regional arrangement and governmental, non-governmental, local institutions.

4.5.7 GHG Emissions

- The analysis of GHG emissions was limited to CO₂, CH₄, and N₂O. Thus, the other GHG gases such as Nox, CO, NMVOCs, HFCs, PFCs, and SF₆ need to be considered.
- In the petroleum sector, a comprehensive study for measuring and monitoring CH₄ emissions from exploitation, transmission, and distribution is needed.
- Mitigation modeling of GHGs emissions in the agriculture sector is needed, especially the estimation of carbon fraction in Egyptian rice fields

4.5.8 Solar Energy

Solar energy is one of the most promising sources of renewable energy for the future in North Africa how to address the increasing energy demands of citizens in a sustainable manner and within the long-term context of climate change – constitute some of the most pressing and complex external relations policy challenges of our times. The Mediterranean Solar Plan. Identified as one of the priority initiatives of the Union for the Mediterranean, its aim, as the name suggests, is to increase the use of solar energy in the Mediterranean. By facilitating energy production from renewable energy sources, we are confident it will provide a boost for green electricity trade and encourage the development of a “Euro-Mediterranean green electricity market”. It should help address internal energy demand in participating countries, as well as help us implement the European Energy and Climate Package. In terms of commissioning action, three priorities areas include:

- The need to continue supporting the development of a stable legislative and regulatory framework in the Euro-Mediterranean area. It should favor the development of renewable energy and be based on the EU achievements. Several projects are already underway which seek to do just that, for example that with Euro-Mediterranean energy regulators (Medreg).
- Learning from other country experiences , for example the German experience with the Regional Centre for Renewable Energy and Energy Efficiency in Cairo should be shared with all NA countries
- To make the Mediterranean Solar Plan a real success, the active engagement of all stakeholders is needed from government, industry, researchers and local communities.

4.5.9 Redirecting Adaptation Planning at the National Level

Many working in North Africa’s climate policy arena understand this dilemma and are taking steps to plan for a climate-resilient society. With a dedicated and resourceful core group of researchers and advocates, the country recently developed several climate policies that address development. These include the Long-Term Mitigation Scenarios, the National Sustainable Development Framework, and important climate response strategy documents from both the environment department and the department of science and technology.

The role of government: case of agriculture

Governments have a fundamental role in promoting resilience in the farming sector because:

Individual farmers do not have the resources to collect and analyze the massive volume and complexity of information needed to design and build the most resilient farming systems, the private sector's incentive to carry out this work is limited, given the timescale over which the necessary information must be collected, the uncertainty of results, and the low opportunity for commercial return on research investment.

The role of governments in agricultural (food production) sector can also include giving farmers clear information about the projected changes and possible impacts on their current practices, the tools to make decisions about their future farming practices, providing extension and educational training about how to make these changes, and giving access to new opportunities that may arise as a result of climatic changes.

Successful adaptation requires the ability to understand what is changing, and how to respond to those changes. Farming in a changing climate requires good decision-making skills, and the appropriate tools. Decision support tools will be critical to give producers the skills and capacity to make timely and well-informed decisions. There are currently a number of such tools available for some, but not all, sectors. Even with existing tools, the relevance and suitability for addressing climate change has not been evaluated, and modifications may be required to deal with it.

In terms of potential end-users, farmers in the mountain and rural areas will be unable to implement a (Decision Support System) DSS due to high illiteracy and the poor school enrolment figures

4.6 Perspectives on the North African Experience

The general sentiment among stakeholders involved in climate legislation and adaptation planning in North Africa is positive and encouraging North Africa's diversity of governmental departments, academic institutions, NGOs, and citizens. In the national government and at the "grass tops" of civil society, many of these players understand the need for reconciling adaptation with national development priorities. However, broad public awareness about climate change remains low, and many citizens do not yet see how climate adaptation is relevant to their own social and economic concerns.

5. RESULT SYNTHESIS

	Adaptation	Mitigation	supporting and enabling measures
Situation analysis	there are a range of adaptation actions taking place in the North Africa across sectors and institutions Very few, if any of the	The wind and solar power represent the greatest percentage of the energy produced in the sub-region. North Africa Region has very	There exist more programmes, initiatives and programmes of building adaptive capacity than of implementing concrete adaptation actions across all sectors the focus is more on research into the impacts,

	<p>adaptation actions are solely due to climate change.</p> <p>Many drivers of adaptation are not climate related, even though climate is just one of the drivers.</p> <p>The majority of examples in the inventory were found in the public sector</p> <p>In the land use sector, there are few examples of planned adaptation to climate change across North Africa</p> <p>A lot of events such as flooding, storms and other extreme events are noted as drivers. Whereas experts may see these as indications of climate change being a driver, institutions and individuals do not necessarily perceive them as climate change.</p>	<p>low levels of energy efficiency, and as a result, energy efficiency has become a high priority for most North African governments</p> <p>The North is estimated to suffer the impacts of sea level rise and associated coastal erosion,</p> <p>for North African countries, avoiding deforestation is not currently included in the CDMs</p> <p>Current carbon finance mechanisms are not delivering enough resources</p>	<p>vulnerability assessments so as to identify ways to improve or change management practices accordingly</p> <p>The likely reason why many examples of the projects focus on building adaptive capacity could be attributed to uncertainty of the future climate change impacts that might be expected</p> <p>The inventory shows evidence of adaptation occurring under a collaboration of various different institutions, public, private including community-based. Across the sub-region, strategies, programmes, policies and legislation are increasingly addressing the impacts of climate change</p> <p>Adaptive capacity building is taking place largely at the national scale, e.g. in national government policies and programmes</p>
	Adaptation	Mitigation	supporting and enabling measures
Achievements, Lessons learnt and experiences	<p>Most of the examples of the programmes are on planned adaptation rather than unplanned</p> <p>Unplanned adaptation often seems to be the result of a 'side-benefit' of an action or</p>	<p>North African countries have opportunities to evaluate trade-offs to improve energy efficiency, reduce emissions and increase urban environmental health outcomes by</p>	<p>African Common Position on Climate Change: AMCEN Special Session attended by participants from UNECA, UNESCO, UNDP, WHO, WMO, UNFPA, UNEP, WFP and IOM.</p> <p>ClimDev-Africa : program to</p>

<p>Achievements, Lessons learnt and experiences</p>	<p>decision taken for other reasons.</p> <p>International Directives and their impacts on the sub-regional climate and other policy issues became apparent, and it was clear that these regional initiatives indirectly contribute to adaptation in particular in the rural land use, agriculture and water sectors</p> <p>In the rural land use sector the Common Agricultural Policy has had significant impact.</p> <p>Yet, there is increasing awareness among government agencies and their decentralized administration on the need to link climate change with biodiversity and ecosystem conservation</p>	<p>promoting energy sector reforms</p> <p>Cables to transmit electricity from North Africa to Europe have already been built under the sea. The study calculated that solar thermal power plants could supply 68 percent of North Africa's as well as Europe's electricity by 2050.</p> <p>Land degradation is too large a problem for a single institution to address alone</p> <p>Improving ground and surface water demand management requires sector-wide reforms to overcome the current state of governance</p>	<p>enhance response to climate change in Africa through: (i) Building on solid science and observational infrastructure, (ii) Enabling strong working partnerships between government institutions, private sector, civil society and vulnerable communities; and (iii) Creating and strengthening knowledge frameworks to support and integrate the actions required</p> <p>Too many overlapping and scattered programs and missions with conflicting objectives</p> <p>Inter-agency cooperation has been a very effective way of tackling climate change in the sub-region. However, there is a lack of funding to bring policy and capacity-building activities to scale.</p> <p>Mechanisms are not yet available to facilitate joint resource mobilization or joint budgetary contributions.</p>
	<p>Adaptation</p>	<p>Mitigation</p>	<p>supporting and enabling measures</p>
<p>The challenges and gaps</p>	<p>A lack of critical mass in human resources capacity is evident throughout the region. Several themes under capacity gaps are:</p> <ul style="list-style-type: none"> - improving policy and institutional environment - limitations of the skills base capacity at district and local level - lack of integrated planning and 	<p>The main challenges and specific objectives for North Africa governments to improve energy efficiency include:</p> <p>Delivering electricity to isolated rural populations, based on village-scale mini-grids;</p>	<p>Maximizing national participation without overloading the institutions is a major implementation challenge in regions with limited capacity.</p> <p>One of the major capacity gaps identified in this analysis is the paucity of scholarly networks to promote and conduct good social and ecological science, and develop ways</p>

<p>The challenges and gaps</p>	<p>management</p> <ul style="list-style-type: none"> - capacity in civil society - capacity for monitoring and evaluation - lack of action on climate change - capacity to manage selected ecosystem services for poverty alleviation. <p>Identified barriers to adaptation include :</p> <ul style="list-style-type: none"> - Knowledge: uncertainty, how to make development plans climate resilient and the cost of adaptation - Information: Lack of public awareness - Financial: Lack of availability of funds - Technological: Lack of availability and access - Institutional: Limited capacity 	<p>Accelerating the integration of REs on the national electricity grids with the objective of reaching grid stabilization and meeting supply-demand balance;</p> <ul style="list-style-type: none"> -Addressing the global approach of REs introduction (mainly solar) in the building sector in coherence with the energy efficiency policy; -Desalinating sea water in order to increase water supply and availability for drinking and irrigation; -Increasing agricultural water supply by pumping using solar, wind and biomass powered water pumps; -Disseminating cooling systems for the food conservation, powered by renewable, in farms and fisheries; addressing, in the grid-connected urban and tourist areas. 	<p>to integrate science into policy making.</p> <p>several types of research gaps were identified:</p> <ol style="list-style-type: none"> a. The need for empirical data, and methods to collect them; b. The need to understand social-ecological processes; c. The need to promote knowledge development and knowledge sharing; d. The need for monitoring, to enable adaptive management. <p>-If research is to be effective it needs to be translated into appropriate policy and management knowledge, which then needs to be communicated (in appropriate form) to the relevant stakeholders so that the necessary actions can be taken. Key ingredients of a communication strategy include: A 'political' champion</p> <ul style="list-style-type: none"> -A long-term vision -A dedicated communication strategy and budget -Repeated messages -Ownership and a sense of pride in the project by local people and officials. -Participatory research -Significant scale -Cross-disciplinary communication -Make ideas real -Clear messages to land managers and planners.
	<p>The effects of climate change could re-affirm the urgency of implementing these new policies and reforms without delay so as to make water resource management more environmentally, socially, economically and financially sustainable.</p>		

Proposed
recommendations

- There is an immediate need to move from preparation and planning to focus more on practical adaptation actions, with the information available, even though there may be gaps, it is vital to move very fast into to concrete actions
- There is a need to establish a network on Community Based Adaptation. Such initiative could be used to support further collaboration between North African Institutions;
- Establish a task team to make plans for mitigating the negative impact of climate change in North Africa;
- Put in place frameworks of dialogue and information exchange decentralized at local level
- Establish regional cooperation on product standards development and dissemination, and on geographic information systems (GIS);
- Develop networks among existing centres of excellence, especially through the Internet, for cross-border staff exchanges and training programmes, and develop schemes to assist displaced African scientists and researchers;
- Continue to improve the environment for investment to encourage private sector investment in carbon finance activities.
- Work with the international community and other stakeholders to facilitate progress in reducing deforestation in North Africa.
- Improve access of local communities to weather and climate-related information and to the knowledge of best coping strategies.

More focus on adaptation measures in Africa;

- promote cross-border cooperation and connectivity by utilizing the knowledge currently available in existing centres of excellence within the Sub-Region;
- develop and adapt information collection and analysis capacity to support productive as well as export activities;
- generate a critical mass of technological expertise in targeted areas that offer high growth potential, especially in biotechnology and natural sciences;
- assimilate and adapt existing technologies to diversify manufacturing production
- Additional resources in support of adaptation and mitigation;
- Mainstreaming climate change issues into the sub-Region's economic planning and management, while taking into consideration situations in each country;
- Support for effective North Africa's representation in future negotiations on climate change;
- Conducting joint study among African Union Commission, NEPAD Secretariat and the APF Support Unit to promote greater access for the sub-Region to the world carbon market;
- Establishing through joint efforts, an effective post-2012 framework with participation of all countries
- Strengthening support for NEPAD environmental action plan, ClimDev Africa program, Africa Climate Center as well as initiatives on information and early warning systems and knowledge production.
- Encouraging partnership for technological transfer including public and private partnership, in particular for cleaner production and renewable

Proposed
recommendations

- energy.
 - UMA support to the development of the Comprehensive Framework of the Sub-Region Climate Change Programmes.
 - Support NEPAD initiative in Mapping of regional actors/ institutions working on Climate Change and in the establishment and maintenance of a database of programmes
 - Support the implementation of NEPAD climate change initiatives including CLIMDEV, African Monitoring of the Environment for Sustainable Development (AMESD)
 - Providing additional financial support for capacity building for African institutions and implementation of regional programs;
 - Supporting programs for reducing vulnerability of women to the impacts of climate change.
-
- Widespread poor forest governance must be improved, with **REDD** providing strong incentives for building good governance of primary forests and other natural ecosystems at local, national and regional levels, including, *inter alia*:
 - enhancing transparency of forest management by participating governments,
 - enhancing transparency of national REDD processes through genuine multi-stakeholder engagement in national REDD groups,
 - good fiscal governance,
 - participatory law reform, and
 - improved forest laws and enforcement of such laws
- North Africa should strive to develop its abundant solar energy resources;
- To improve the reliability and lower the cost of energy supply to productive activities in order to enable economic growth
 - To reverse environmental degradation that is associated with the use of traditional fuels in rural areas;
 - To integrate transmission grids and gas pipelines so as to facilitate cross-border energy flows;
 - To reform and harmonise petroleum regulations and legislation on the continent.
-
- . Plan and manage water resources to become a basis for national and regional cooperation and development;
 - . To systematically address and sustain ecosystems, biodiversity and wildlife;
 - . To ensure enhanced irrigation and rainfed agriculture to improve agricultural production and food security.
- Expand access to secondary education and improve its relevance to Sub-Region's development;
Promote networks of specialized research and higher education institutions.
- Sensitization of North Africa governments and peoples to climate change and variability, including sea level rise and their potential impacts, is highly necessary to promote sustainable development in the face of GHG climate change.

6. CONCEPTUAL FRAMEWORK FOR NORTH AFRICAN CLIMATE CHANGE PROGRAMMES

North Africa's priorities are to implement climate change programmes in such a way as to achieve sustainable development, in particular to alleviate poverty and attain the Millennium Development Goals, with emphasis on the most vulnerable groups, such as women and children.

Given that Africa is the most vulnerable region with the least adaptive capacity, adaptation is the most immediate priority. There is a need, however, for global mitigation of greenhouse gas emissions as a primary mechanism to prevent long-term climate change impacts on this region. In addition, effective implementation of mitigation measures offers opportunities for Africa to increase its economic competitiveness along a sustainable path of low-carbon development.

There is a need to move towards faster regional integration. This would help mobilize the required resources for research in the Region. Networking will be essential if the North African scientific community is to gather the momentum it needs to make progress. Regional research hubs could be established (under a hub-and-spoke model). A simplified policy framework is illustrated in Figure 2 below.

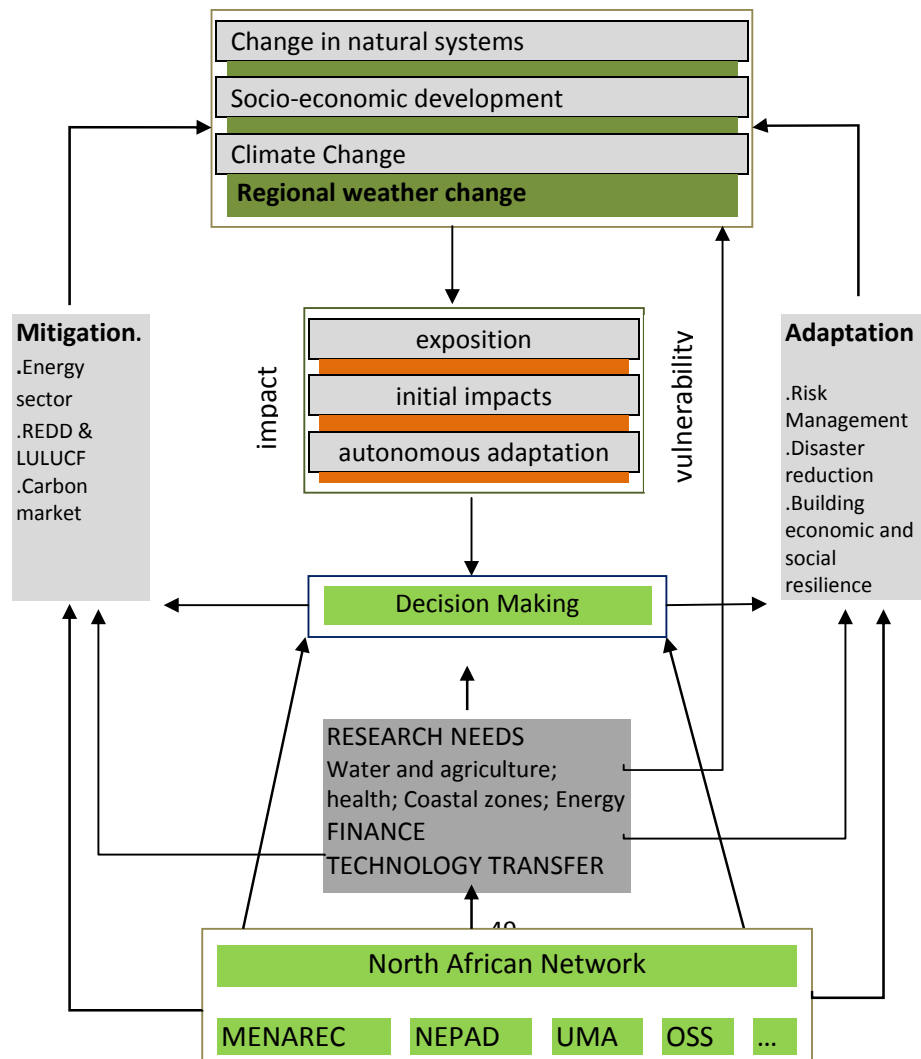


Figure 2: A conceptual policy framework

However, it must be clearly understood that government alone cannot carry out the tasks identified in this document. Success will only be achieved through the total involvement of the stakeholders both from the public and private sector including non-governmental organizations. The Regional climate change response strategy thus needs to be owned by them as much as by the government sector if it is to represent a truly national course of action. Rather than regarding this document as a rigid prescription for what has to be done, it should be updated regularly to accommodate new ideas and directions as the need arises, and when such issues are identified by any of the stakeholders, not just government. The overall implementation of the strategy will require substantial financial and other resources. As climate change is a cross cutting issue, various sources of funds can be tapped. In addition donor funding is available for various aspects of climate change work.

North Africa needs to develop a framework to effectively access and manage these funds. While it is extremely important to understand the reality and constraints of the North African economy, no door must be closed to any action based on sound economic principles, which can bring tangible benefits to the sub-region and its people. Both physical and economic vulnerability are relevant.

A number of key interventions, supporting this framework have been proposed in this document that cut across the entire spectrum of possibilities for climate change response actions. Through the implementation of this sub-regional climate change response programme, North Africa will avail itself of the potential advantages that could stem from international action on climate change, whilst at the same time minimizing its vulnerability to such events. The following key actions will be taken to achieve this end:

- (a) Rapidly develop the DNA function within the countries to facilitate the forwarding of CDM project proposals to the Executive Board for approval without undue delay.
- (b) Perform a technology needs analysis for North Africa that builds on and integrates existing knowledge, through UMA and Egypt.
- (c) Set up a contemporary database of climate change related research, development and demonstration projects for North Africa.
- (d) Develop and maintain an investment friendly climate to attract developed country partners to invest in climate change related projects in North Africa, primarily through the Department of Trade and Industry.
- (e) Access appropriate funds, as feasible, for implementation of the climate change programme, in particular for adaptation purposes.
- (f) Accelerate the process of education, training and awareness of climate change and its impacts to speed up the implementation of response actions.

- (g) Harness the efforts of all stakeholders to achieve the objectives of the MENAREC's conferences on Renewable Energy and the Energy Efficiency Strategy, promoting a sustainable development path through coordinated MENA government policy.
- (h) Implement a transport sector mitigation programme, in conjunction with the Region's energy efficiency strategy and the joint implementation strategy for the control of exhaust emissions from road-going vehicles, through the National Department of Transport.
- (i) Implement sustainable industrial development through coordinated policies, strategies and incentives through the Department of Trade and Industry and the various industry sectors.
- (j) Extend health protection and promotion measures to counter climate change related impacts
- (k) Accelerate water resource management and contingency planning and adapt agricultural, rangeland and forestry practices appropriately
- (l) Develop protection plans for plant, animal and marine biodiversity.
- (m) Optimize waste management practices to minimise the emissions of greenhouse gases and develop a government position, through all relevant departments and all spheres of government and industry, to implement a waste sector mitigation programme.
- (n) Maintain an appropriate attendance at UNFCCC and related meetings, and contribute their views and thinking to the AR5.
- (o) Use the ongoing law reform process to ensure that climate change issues are provided for in North African legislation.
- (p) Introduce greenhouse gas emissions into air quality legislation and put in place a national ambient information handling system that incorporates greenhouse gas data alongside air pollution data.
- (q) Set a time frame for action, with specific milestones and responsibilities, to formulate appropriate national policies and measures for climate change action and develop a practicable plan of implementation.

7. CONCLUDING REMARKS

Like many other regions, North Africa already has a major existing climate adaptation challenge, which climate change is likely to deepen. And like many other regions, NA's adaptation challenge is inextricably linked with its development challenge. NA's prospects for growth and prosperity are clearly affected by climate change.

In the inventory we addressed adaptation to climate change at different scales of administration or management, and geographical location. Across sectors we have looked for evidence of adaptation in central government, regional and local authorities and so on.

In the private sector, we included large and small firms and individuals. While there are numerous international efforts underway to develop the understanding of the science of climate change and its impacts, as well as to implement greenhouse gas reduction and mitigation strategies, there are fewer efforts focused on adaptation. There appear to be very few, if any adaptations that are solely due to climate change.

While numerous community-based adaptation activities are supported by a wide range of NGOs and other intermediaries, they reach only a minuscule fraction of those at risk. A pressing challenge is to replicate their successes far more widely. Scaling up has often been limited by poor links between local stakeholders and government institutions. Issues of authority, responsibility, and funding often impede cooperation. Successfully scaling up community-driven development will require that its supporters and governments think of the process beyond the project and of transformation or transition to avoid projects coming to a brutal end when funding stops (i.e. if there is not an ongoing training after the project has been finished the results are not sustainable). Capacity, pivotal to success, includes motivation and commitment, which in turn require appropriate incentives at all levels

There is an inadequate understanding and appreciation of the importance and value of ecosystem services, even provisioning ones, on behalf of planners, bureaucrats and policy makers, resulting in many avoidable negative trade-offs. Consequently, there is an urgent need for better research and communication of that research to these agencies

Capacity gaps existed in all countries at different levels. A lack of critical mass in human resources capacity was evident in the sub-region. This does not mean they lack successful programmes, but more that they have limited capacity to take on new programmes or react to evolving international or regional trends and ideas. The local pools of scientific expertise are particularly small in these countries, resulting in much research being conducted by outside agencies, especially international ones. This is especially problematic regarding monitoring of ecosystem services and of specific programmes. The civil unrest in North Africa over the last decade has resulted in an exodus of many skilled and experienced officials and scientists. Furthermore, the economic crisis has meant that those remaining are incapacitated by the lack of operating budgets, and demoralized by insecure futures and payment structures.

Adaptation priorities and options seem to depend on both the biophysical geography (e.g. risk of flooding, drought) and socio-economic and governance system (e.g. devolved administrations). This needs to be taken into account in planning and implementation of concrete adaptation. Each location might require different action plans and resources to address adaptation.

The reason that the majority of examples are of building adaptive capacity is attributed to uncertainty of the future climate change impacts that might be expected, in particular at local scales. Many of the examples are of research that has been or is being carried out to investigate these impacts and what the options for adaptation might be. A further explanation might concern the time-scales on which most institutions operate. While climate change is a long-term problem, most institutions are faced with short-term pressures, both in the public and private sector. At the highest level of decision making in

Regarding mitigation, CDM potential in NA region seems to be particularly rich in a number of project sectors, notably energy efficiency improvement, solar and wind energy, and waste management. As the case of the majority of developing countries, exploitation of this CDM potential goes hand-in-hand with the accomplishment of others aims, such as increase of living standard, environmental improvement fight against poverty and desertification. However, CDM potential in NA Region is still in its very initial stages of exploitation. Only Egypt, Morocco and Tunisia have by now registered CDM projects and present some activity.

Obviously, the CDM's priorities do not reflect climate science. This is mainly due to the fact that CDM projects are marked driven and initiated by private companies which clearly will do what is most profitable, not what is best for the climate or society. However the results indicate that technology transfer in CDM projects is more common as project size increases regardless of project type and host country. Technology transfer is less common for unilateral projects – more common for projects with foreign participants – regardless of the project characteristics or host country.

Considering the severe consequences of the North Africa Sub-Region wide water crisis that has never been faced before, and the long time that is necessary to build a sustainable alternative, the governments of NA should immediately start to establish the necessary political and technological conditions for efficient water management and for a quick market introduction and expansion of CSP and other renewable energy sources for power and seawater desalination

North African Governments have significant knowledge about the anticipated impacts of climate change on Social-Ecological-System (SES), and have already taken significant steps to assist the society to adapt to these impacts. However, the extent of climate change impacts which are anticipated to affect North Africa's SES highlight the need for a sub-regional approach to adaptation.

ANNEX 1 :INVENTORY OF ADAPTATION AND MITIGATION ACTIONS IN NORTH AFRICA

Adaptation – A

Disaster reduction and risk management (DRRM): Early warning; preparedness; emergency response; and post – disaster recovery

A: FRAMEWORK OF NORTHERN AFRICA CLIMATE CHANGE PROGRAMMES (WORK SHEET- ADAPTATION & MITIGATION)

Organization	Type DRRM	Relevant focus	Strategies	Programme (Pr)/ Initiative (I)/ Projects (P)	Where in NORTHERN Africa	Website of Organization
Adaptation – A. Disaster reduction and risk management (DRRM): Early warning; preparedness; emergency response; and post –disaster recovery						
Global Facility for Disaster Reduction and Recovery GFDRR	preparedness	The activity aims to assist the national and local governments in assessing and valuing the vulnerability of the coastal cities Alexandria, Casablanca and Tunis respectively, to natural disasters while underlying the synergies with climate change vulnerability.	Egypt, Morocco and Tunisia, are i) investigating the natural disaster preparedness of select coastal cities within their country. ii) preparing coastal urban vulnerability maps and performing an economic valuation of the potential damage costs and remedial actions.	P	Egypt, Morocco and Tunisia,	http://gfdr.org
GFDRR Ministry of Agriculture and Rural Development	Disaster Recovery	The activity objectives are: (i) to provide Morocco's 7 PAZ's with a detailed methodology to develop a national risk management strategy for agriculture and an integrated drought management strategy; and (ii) to determine the needs in terms of information, staffing, training, and equipment, to develop both the strategies	<u>Expected Outcomes</u> A procedure is in place to assess the disaster risk implications of major infrastructure project proposals <u>Result Indicators</u> The systematic incorporation of risk reduction into the imp. of emer. preparedness, response and recovery programs <u>Output Indicators</u> Professional Training	P	Morocco	http://esdsr.worldbank.org/gfdr/activity_details.cfm?oid=1578&rg=763&PrintMode=ye .
UE OSS Algerian space agency	Early warning	Desertification monitoring pilot systems the Mediterranean South countries: Tunisia and Morocco. Study of the	<ul style="list-style-type: none"> • identify needs and select technical options; • elaborate and test vulnerability indicators on a regular basis; 	P	Algeria Morocco Tunisia	http://www.oss-online.org

– ASAL Royal centre for remote sensing-CRTS Morocco National remote sensing centre CNT-Tunisia		extension to Algeria The project led to the setting-up of a cartographic server and the creation of various desertification-monitoring indicators	<ul style="list-style-type: none"> • share information ; • integrate indicators into national evaluation-monitoring devices of environmental action programmes; • disseminate results 			
GTZ with HCEFLCD High commissariat of water and forest and combating desertification	Preparedness	Sustainable use of NRM and ecosystem services Capacity development	the project supports the adaptation of the existing institutional and legal framework. It promotes coordination between the different ministries involved and cross-sectoral topics such as results-based monitoring, financing the sustainable use of resources and national strategies on eco-tourism, environmental education and participative resource management	P	Morocco	www.gtz.de
Ministère de l'Aménagement du Territoire et Environnement German Federal Ministry for Economic Cooperation and Development (BMZ)	Preparedness	At national level, it advises the Government, particularly the Ministry of the Environment, on preparing legal regulations on environmental issues. At regional level, it helps the local authorities develop an operational service sector. Economic and ecological analyses are used to identify and assess environmental risks.	developing and implementing communication and awareness-raising strategies. Seminars, a "Green Theatre" and a "Green Radio" are used as instruments. An "environment train" helps put across environmental messages. The programme also aims to achieve international accreditation for Algerian environmental auditors and to produce manuals containing guidelines for emission reduction officers.	Pr	Algeria	www.enviro-gestion.org
University of Marrakesh Centre Développement Région Tensift (CDRT)	Preparedness	Development of strong ground- and remote sensing based data layers including climate data and socio-economic attributes to assess risk-levels of climate change	The project will thus provide both detailed descriptions about the methodology and tools for making climate impacts and adaptation assessments, as well as a suite of realistic adaptation measures for key	P	Morocco	www.ucamac.ma/ccam

START		potential vulnerabilities and their consequences at local and sub-regional scales for time horizons extending the next 10-15 years.	ecosystem goods and services in large regions of Southern Morocco.			
Department of Water	Early warning	National Plan for Protection against Floods: target of 20 protected sites by year / Development of flood warning and emergency plans	strengthen of the national plan against flooding: expand the warning system and contingency plan	Pr	Morocco	www.mem.gov.ma
DMN	Early warning	The National Meteorological Service of Morocco has established a plan to improve forecasting and dissemination of weather alerts including those related to extreme weather phenomena.	The plan is structured around four main areas: <ul style="list-style-type: none"> •The Improvement of technical means related to surface and altitude observation, •The upgrade of production and dissemination tools, •The modernization of telecommunications scheme, •The training of forecasters. 	Pr	Morocco	http://www.marocmete.o.ma
Department of Water	emergency response	Plan of drought	management and emergency by catchment basin	P	MOROCCO	
HCEFLCD	Early warning	Reinforcement of the plan of forest fires warning	The fight against forest fires, through the increasing resource endowments for the prevention and extinction of forest fires by means of preventive silviculture, awareness-raising campaigns and increment of the ground and aerial resources for extinction and monitoring.	Pr	MOROCCO	
Department of Water	Water	Water saving	Reinforcement of the system of control and penalties for over-exploitation of groundwater	P		
Department of Water	Water	Water saving	Taking into account best practices for water saving in the construction standards	I	Morocco	www.water.gov.ma
Department of the Environment	Water	Green taxation	Green taxation for saving water by individuals	Pr	Morocco	www.minenv.gov.ma
Department of the Environment	Water	Recover rainwater	deliverance of credits to purchase reservoirs to recover rainwater	Pr	Morocco	www.minenv.gov.ma

Department of Water	Agriculture	generalization of drip	Conversion to drip irrigation	Pr	Morocco	www.water.gov.ma
Department of Water	Agriculture	rehabilitation of irrigation systems	Improvement of yields of water supply networks to irrigated area	Pr	Morocco	www.water.gov.ma
Department of Water	Agriculture and water	promotion of participatory irrigation management	Implication of local associations and regional services	I	Morocco	www.water.gov.ma
Department of Water and Ministry of Agriculture	Agriculture and water	Adoption of modern irrigation	financial support for adoption of modern irrigation	Pr	Morocco	www.water.gov.ma www.madrpm.gov.ma
Department of Water	Water	planning of dams and drainage channels	Realization of 59 large dams between 2008 and 2030 and Continuation of the program of small and medium dams	P	Morocco	www.water.gov.ma
Department of Water	Water	Limitation of pumping in groundwater /Programs of artificial recharge of groundwater	Strategy of protection of groundwater resources	I	Morocco	www.water.gov.ma
Department of Water	Water	Water resources	Backup program of water sources	I	Morocco	www.water.gov.ma
Department of Water	Water	Wetlands and natural lakes	program of protection of wetlands and natural lakes	Pr	Morocco	www.water.gov.ma
HCEFLCD	Forests	Oases	Program of preservation of the oases	Pr	Morocco	www.eauxetforets.gov.ma
Ministry of Agriculture and ONEP	Water, Forests and agriculture	Reuse of treated wastewater: 300 Mm3/an treated wastewater reuse in irrigation of golfs, parks and agriculture	Program of wastewater reuse	Pr	Morocco	www.madrpm.gov.ma www.onep.org.ma
Department of Water	Water	Collecting rainwater	Program of collecting rainwater	Pr	Morocco	www.water.gov.ma
Ministry of Agriculture	Agriculture	Technical measures - Changes in agricultural practices	use of selected seeds and choice of varieties adapted to climate	I	Morocco	www.madrpm.gov.ma
Ministry of Agriculture and Department of water	Water and Forests	Soil erosion	protection against soil erosion, pollution and desertification / soil protection by vegetation: olive and fruit trees	Pr	Morocco	www.water.gov.ma www.madrpm.gov.ma
Ministry of Agriculture	Water and agriculture	new species resistant to water stress	introduction of Program of new species resistant to water stress	P	Morocco	www.eauxetforets.gov.ma
HCEFLCD	Forests	Reforestation	reforestation strategy	Pr	Morocco	www.eauxetforets.gov.ma
HCEFLCD	Coastal zones	Distribution and abundance of	Impact assessment of climate	P	Morocco	www.eauxetforets.gov.ma

		marine and terrestrial species	change on the distribution and abundance of marine and terrestrial species			ma
Ministry of Tourism	Coastal zones and Forests	Tourism activities	Program of restrictions on tourism activities can affect ecosystems	Pr	Morocco	www.tourisme.gov.ma
Department of the Environment	Forests	Desertification	Assessment of the strategy against desertification in relation with climate change	P	Morocco	www.minenv.gov.ma
National Committee for Crisis Management and Disaster Risk Reduction (NCCMDRR)	Preparedness	The NCCMDRR, a multi sectoral platform for disaster risk reduction and crisis management is functioning as the "National Platform". It has several	A Scientific Advisory Board (SAB) was established as a subsidiary body to the NCCMDRR in 2008. In view of the sustainable development policy, Egypt regards its national Millennium Development Goals (MDGs) as a key instrument for mainstreaming disaster risk reduction.	P	Egypt	
CMDRS/ IDSC	preparedness	Risk assessment was developed for several disasters, (earthquakes and flash floods for example).	A number of models of specific contingency and preparedness Emergency plan to address Nile-related crisis and its risk reduction. The national plan to manage disasters of flash floods in Egypt and their risk reduction.	P	Egypt	
CMDRS/IDSC	Early warning	Early warning systems linked to some major hazards (earthquakes, flash floods and air quality) are in place, with indirect outreach to communities.	This warning system is linked mostly to the media and employs a variety of communication processes, with a structure of hierarchical relations through which communication flow.	P	Egypt	
Department of Water	preparedness	National Plan for Protection against Floods: target of 20 protected sites by year / Development of flood warning and emergency plans	strengthen of the national plan against flooding: expand the warning system and contingency plan	Pr	Morocco	www.water.gov.ma

Department of Water	emergency response	Financial support	Development of the financial mechanisms as insurance and disaster funds.	I	Morocco	www.water.gov.ma
Department of Water	preparedness	Drought management	Plan of drought management and emergency	Pr	Morocco	www.water.gov.ma
HCEFLCD	emergency response	Fires warning	Reinforcement of the plan of fires warning	Pr	Morocco	www.eauxetforets.gov.ma
Direction of the National Meteorology	preparedness	Reinforcement of Research on Climate Change	Reinforcement of Climate change Research over Morocco and quantifying vulnerabilities	Pr	Morocco	www.marocmeteo.ma
Ministry of health	preparedness	Health alert plans	Reinforcement of health alert plans	Pr	Morocco	www.sante.gov.ma
Department of Water	emergency response	Misuse of water	fight against the misuse of water	I	Morocco	www.water.gov.ma
Department of Water	emergency response	Improvement of network performance of water	fight against the loss of water infrastructures	I	Morocco	www.water.gov.ma
Department of Water	preparedness	feeding hydrants	Rationalization of feeding hydrants in rural areas	Pr	Morocco	www.water.gov.ma
Department of Water	Emergency response	Saving of Industrial Water : plan of water conservation, water recycling, unconventional water.	Standardization and incitation to use of appropriate technologies to save water / Improving efficiency of water use in industry and for tourist units / Incentives for recycling water	Pr	Morocco	www.water.gov.ma
Department of Water	Emergency response	Erosion	Protection of catchment basin upstream dams against erosion	I	Morocco	www.water.gov.ma
Department of Water	Emergency response	Exploitation of groundwater	Reinforcement of the system of control and penalties for over-exploitation of groundwater	I	Morocco	www.water.gov.ma

Department of the Environment	Preparedness	Research on the evolution of coast	development of scientific research on the evolution of coast	Pr	Morocco	www.minenv.gov.ma
Ministry of health	Early warning	Extreme weather events	Alert plans to extreme weather events to prevent their effects on the population	Pr	Morocco	www.sante.gov.ma
ABHT Tensift Basin Agency, Marrakech, Japanese Cooperation (JICA)	Early warning	Flood Forecasting System in areas around Ourika Valley in southern Marrakech. This system employs the latest IT to wirelessly collect automatically measured data regarding rainfall and changes in surface of the river	Use of radar network information for a better improvement of the early warning system to natural disasters (flash flood). The project include linkage and cooperation between the observation station and local police, municipalities, residents, and tourist agencies.	P/I	Morocco	http://www.eau-tensift.net/site-web.html

Adaptation – B

Sectoral planning and implementation (SPI): adaptation in key sectors – water; agriculture; health; energy; forests; coastal zones; infrastructure; urban management and tourism

A. FRAMEWORK OF NORTHERN AFRICA CLIMATE CHANGE PROGRAMMES (WORK SHEET- ADAPTATION & MITIGATION)

Organization	Type SPI	Relevant focus	Strategies	Programme (Pr)/ Initiative (I)/ Projects (P)	Where in Northern Africa	Website of Organization
Adaptation – B. Sectoral planning and implementation (SPI): adaptation in key sectors – water*; agriculture*; health*; energy*; forests*; coastal zones; infrastructure; urban management and tourism						
UNDP / GEF-SGP Community Based Adaptation (CBA) Programme	Cross-sectoral (water, agriculture, forests, coastal zones)	Small-scale projects are implemented to increase community/ecosystem resilience to climate change	Community-based adaptation. Building on local participatory vulnerability assessment and on local knowledge, the programme supports small-scale adaptation projects. The lessons learned from these initiatives are shared and disseminated for upscaling and mainstreaming adaptation at national and global levels).	Programme <i>Objective in Morocco : 12 CBA projects by 2011.</i>	Morocco	www.undp-adaptation.org/project/cba
<i>Pilot CBA projects</i>						
Espace Rural Tarmguiste (Partners : CBA – SGP; POS)	Water and agriculture	Increase the resilience of the Tarmguiste Oasian ecosystem to the impacts of climate change	Improve water management and irrigation systems; Experiment with resilient agricultural and forestry species; Experiment with a special revolving fund for adaptation; Build the capacities of local community: water management, resilient farming and pastoral practices.	Project (in preparation)	Morocco	
Association Tiflit Iguiwaz (Partners: CBA-SGP; POS)	Water and agriculture	Increase the resilience of the Iguiwaz Oasian ecosystem to the impacts of climate change	Improve water management and irrigation systems; Experiment with resilient agricultural and forestry species; Experiment with a special revolving fund for adaptation;	P (in preparation)	Morocco	

			Build the capacities of local community: water management, resilient farming and pastoral practices.			
MINISTRY OF ECONOMY AND FINANCE	Water, sanitation and flood protection (Solid waste management) DPL	Public Administration, Law, and Justice (Public administration- Water, sanitation and flood protection) (25%)	The objective of the Development Policy Loan (DPL) program is to support the Government of Morocco (GoM) in implementing its program of reforms aimed at improving the financial, environmental and social performance of the municipal solid waste sector in Morocco.	P	Morocco	http://web.worldbank.org/external/projects/main?Projectid=P104937&theSitePK=40941&piPK=73230&pagePK=64283627&menuPK=228424
IFAD GEF Agency: World Bank MED Sustainable MED Governance and Knowledge Generation	Costal International	The project aims at supporting the actions implemented by the riparian countries on the Mediterranean Sea within the framework of the Barcelona Convention in particular, the protocol on the Integrated Coastal Zone Management ICZM	the project is relevant and allowed to strengthen the initiatives supported by France to promote an Integrated Coastal Zone Management around Mediterranean Sea	P	Algeria, Egypt, Libya, Morocco, Tunisia	http://operations.ifad.org/web/ifad/
IFAD GEF Agency: World Bank	Costal Regional	MED Regional Coordination on Natural Resources Management and Capacity Building The project aims at harmonizing the national approaches in hydrological data collection management in the riparian countries of Mediterranean Sea.	The studies actually working on by "Plan Bleu" as regards the management of the regional hydrological data and the impacts of the climate change on the water resources should be an interesting contribution to this project. This objective should allow at regional level a better understanding of telluric pollution risks and the regional sensibility to climatic variations.	P	Algeria, Egypt, Libya, Morocco, Tunisia	http://operations.ifad.org/web/ifad/
In cooperation with GTZ (2009)	Tourism	Climate Change Adaptation and Mitigation in the Tourism Sector in Tunisia	This study, is designed to provide a pragmatic platform to strengthen the capacity of professionals to understand and respond effectively to the global challenges of climate change in tourism destinations	P	Tunisia	http://gtz.de/en/weltweit/maghreb-nahe-osten/1642.htm
Alexandria Governorate	Urbain Manageemnt	The Egypt Alexandria Development Project objective is to support local	support to basic infrastructure, community facilities and services, including the construction of water,	P	Egypt	

		development in Alexandria by removing key infrastructural constraints, reducing barriers to investment, and ensuring the socioeconomic integration of the poor.	wastewater networks, surface water drains, rehabilitation of access roads, establishment of community facilities, and provision of community services.			
MINISTRY OF AGRICULTURE AND MARINE FISHERIES	Agriculture, fishing, and forestry (Irrigation and drainage) (80%)	This document of the Oum Er Rbia Water Resource Conservation Project of Morocco provides the policy framework for resettlement and land acquisition to be implemented by the irrigation agencies (ORMVAs) and focuses on: the acquisition of land for facilities and infrastructure project (water supply, water tanks, basins and pumping stations, etc.	Agriculture, fishing, and forestry (Irrigation and drainage) (80%) Water, sanitation and flood protection (General water, sanitation and flood protection sector) (20%) Millennium Development Goals for This Project Ensure environmental sustainability	P	Morocco	http://www-wds.worldbank.org
In cooperation with GTZ (2008-2009)	Health	development of a national climate change adaptation strategy: EcoHealth sector	Objective: to reach a thorough understanding of the health conditions in Tunisia through a participatory health diagnosis with an ecosystemic approach, in the country	P	Tunisia	http://gtz.de/en/weltweit/maghreb-naher-osten/1642.htm
PNUD (2008)	Coastal Zones	Etude de la vulnérabilité Environmental and Socio-economic vulnerability of Tunisian coastal to climate change and sea level rise Identification a national adaptation strategy	This project will conduct vulnerability assessments, develop adaptation strategies and coastal policy land use guidelines that reduce vulnerability, and develop local capacity for participatory policy and planning processes	P	Tunisia	
SUSTAINABLE MED Program Framework Global Environment Facility (GEF)	Coastal	Integrated Coastal Zone Management for Lake Nador project assisting Morocco meet its obligations towards the new Integrated Coastal Zone Management (ICZM) Protocol under the Barcelona Convention	ensure that future development is environmentally and socially sustainable natural resources degradation is stopped and reversed risks arising from climate change are appropriately taken into account (with a focus on the Mediterranean Sea as a shared large marine ecosystem)	P	Morocco	
SUSTAINABLE MED Program Framework Global Environment	Coastal zones	Integrated Coastal Zone Management for Conservation and Economic Development	Sustainable Management of scarce resources and biodiversity, and in particular of vulnerable ecosystems,	P	Libya	

Facility (GEF)		developing national and regional capacity and channeling investment lending from multilateral and bilateral developmental banks towards the environment	treated wastewater re-use, land degradation, integrated coastal zone management, protection of marine resources			
SUSTAINABLE MED Program Framework Global Environment Facility (GEF)	Costal zones	Regional: Technical Support, Planning and Capacity for Waste Water Treatment and Recycling Technology	Regional initiatives designed: to support national agendas to address shared challenges affecting the Mediterranean Sea to explore the economies of scale of regional cooperation :	P	Morocco Tunisia Egypt	
Agence Nationale des Énergies Renouvelables (ANER) Natural Resources Canada	Energy	Set-up of a district lighting project. Replacement of vapor lamps, used for the district lighting, by high pressure sodium lamps in municipalities of Tunisia. carry out a complete feasibility study, including an innovative financing mechanism, which could be used by the ANER for the implementation of the project in municipalities.	Development of the best technological approach for the implementation of projects targeting the reduction of energy consumption in the Tunisian street lighting sector. Development of an institutional mechanism that allowed the implementation of such projects. Development of a structure for awareness, training and communication campaigns	P	Tunisia	
ENERPLUS with the support of UNDP	Energy	Cogeneration feasibility Studies set up of a short and medium term action plan for cogeneration development.	Analyzing the company energy consumption profile. Proposing an adequate cogeneration system. Evaluating investment and operation costs.	P	Tunisia	
Technische Universität Berlin, Authorities of Land-Use Planning, Water and Environment in Casablanca	Urban Agriculture	The project analyses to what extent Urban Agriculture can make a relevant contribution to climate-optimised and sustainable urban development as an integrative factor in urban growth centres.	The proposal follows a practical approach which is expected to support and positively influence the development of current UA projects – in cooperation with local partners – and to initiate further activities, using the newly developed strategies and techniques suitably adapted.	P	Morocco	http://www.uac-m.org
IRDC	Water, agriculture	This project will examine	The project will work with multiple	P	Morocco	

Akhawayn university		whether demand-side management (DSM) can provide a solid basis for water management and strengthen the capacity for adapting to climate change in the Saiss basin. Since over 80% of the water consumed in the Saiss is used in agriculture, the project will focus on this sector	stakeholders and endeavor to benefit the most vulnerable and disadvantaged communities on the project sites. Researchers will test technical options for DSM in large-scale irrigation systems; demonstrate the value of DSM to smallholders through pilot projects; create two operational water-users associations supported by training and capacity building; and promote better policy making, enforcement and management on the part of local authorities and the relevant ministries.			
German Federal Ministry for Economic Cooperation and Development (BMZ) Lead executing agency: Ministry of Energy, Mines, Water and Environment	Protecting water resources	The objective of the project is to reform key water policy elements and the responsible institutions in the sector according to the principles of sustainable water resources management.	•At the national level, the project works to support Moroccan authorities in their efforts to interlink regional planning, environmental protection and water management and to increase the coordination capacity of the ministry. Through its Marrakech regional component, the project contributes to decentralisation. In addition, by promoting dialogue between the government, the private sector and civil society, the project contributes to good governance.	Pr	Morocco	www.minenv.gov.ma
German Federal Ministry for Economic Cooperation and Development (BMZ) Lead executing agency: Ministère des Ressources en Eau	Integrated water management programme	The programme has been advising institutions in the water sector since 2002 on how to modernise and reorganise themselves.	National water master plan and implement this plan at national, regional and local level. Training and upgrading measures at management. In the Beni Abbès oasis, the programme is working with all the stakeholders to develop an integrated water management model that is to be transferred to other oases too.	Pr	Algeria	www.mate-dz.org
SUSTAINABLE MED	Water	Water Reuse, Optimization	Accentuated pressures on natural	P	Tunisia	

Program Framework Global Environment Facility (GEF)		and Implementation Program	resources, especially water and land, due to economic and population growth Food shortages, Increased water stress from droughts			
German Federal Ministry for Economic Cooperation and Development (BMZ) Ministry of Water Resources and Irrigation (MWRI)	Water	Management training in Egypt's water sector / Promotion of the National Training Centre at the Ministry of Water Resources and Irrigation	The project supports the national water resource policy and the current reform process. Young management personnel and capable staff are qualified for the competent organisations. The Regional Centre for Training and Water Studies (RCTWS), which is affiliated to the Ministry of Water Resources and Irrigation, is advised in developing and implementing training courses. In addition, it receives support for setting up a training programme especially to manage the reform measures.	P	Egypt	Website of the Egyptian Ministry of Water Resources and Irrigation www.mwri.gov.eg Regional Centre for Training and Water Studies (RCTWS) www.rctws.com
German Federal Ministry for Economic Cooperation and Development (BMZ) Holding Company for Water and Wastewater (HCWW), Ministry of Housing, Urbanisation and Urban Development (MoHUUD)	Water Supply and Wastewater Management	Water supply and wastewater disposal services are improved in selected Egyptian governorates.	The project team advises technical and managerial staff of the Holding Company for Water and Wastewater Management on the topics of management, organisational development and training. Special attention is paid to capacity building in investment planning, in training management and in strategic planning.	P	Egypt	
Global Environment Facility Ministry of Agriculture and Water Resources	Agriculture and Water	improving water resources availability, reducing pollution loads in the Mediterranean Sea and the Gulf of Tunis in particular, and increasing the sustainability of agricultural practices and livelihoods in the context of climate change.	improving the value of water used in agriculture through transforming the incentive systems for water conservation , water capture (dams and storage reservoirs, protecting groundwater resources, using adaptation measures for climate risk in farming systems, and introducing innovative means to increase new sources of water and improving	P	Tunisia	

			water quality .			
Sustainable Cities Initiative (SCI) Algiers' Wilaya.	Urban management	implementation of investments targeted to improve the efficiency of city lighting installations of Algiers' Wilaya, and the modernization of ERMA's operations in order to reduce their costs	Installation of a preventive maintenance system for the reduction of maintenance costs through a better rotation of equipment and availability of the maintenance staff.	P	Algeria	
Industry Canada SCI	Water	Development of water saving programs for the city of Algiers Econoler International helped Algiers's authorities to identify a project targeting the improvement of the drinking water distribution and consumption situation in the city of Algiers	The project's specific objectives consisted of: Assistance in reducing water losses. Water resources management through implementation of a water saving program. Assistance in the identification of grid losses including illegal tapping. Assistance in resolving metering problems.	I/P	Algeria	
UNDP		Mapping of Natural Resources for Agricultural Use and Planning	Establishment of a GIS supported database of natural resources	P	Libya	
Libya Government	Water	Wadi Gattara Dam Rehabilitation	Water storage for irrigation purposes	P	Libya	
		Wadi Al-Wishka Dam	Water Storage for flood protection and groundwater recharge	P	Libya	
		Dam Site Studies	Final studies and detailed design of dams in northern Libya	P	Libya	
		Drilling of Exploratory Wells	Hydrogeological investigations and monitoring networks	P	Libya	
		Soil and Water Studies of SW region	Soil mapping,hydrogeological and geological investigations	P	Libya	
		Hydrogeological Investigations of Sarir Tibesti	Reconnaissance drilling and hydrogeological studies	P	Libya	
		Groundwater Vulnerability Studies	Assessment and mapping of aquifers to determine vulnerability to pollution	P	Libya	
		Wadi Talal Flood Management	Flood control of Sirte city	P	Libya	
		Wadi Abu-Shayba & Al-Rumman Dams	Water storage for irrigation and flood protection purposes	P	Libya	

		Wadi Ahmar Dam	Water storage for irrigation and flood protection purposes	P	Libya	
		Wadi Derna Dams Rehabilitation Libya	Water storage for irrigation, water supply and flood protection purposes	P	Libya	
Libya Libya	Water	Soil and Water Studies of SE Region Libya	Soil mapping, hydrogeological and geological investigations	P	Libya	
		Karst Spring Studies in Eastern Region (Ayn Zayana	Study of the flow regime of the karst system in the eastern zone	P	Libya	
		Study of the Coastal Under-sea Karst Springs	Determination of the occurrence of under-sea fresh water springs	P	Libya	
		Study of Evapotranspiration in the Coastal Sabkhas and Dam Reservoirs	Quantification of evapotranspiration	P	Libya	
		Electronic Archiving and Construction of Water Resources Data Bases Study and Inventory of Irrigated Areas, Phase I	Digitizing of hard copy reports and data sheets, maps, reports and design and operation of data bases. Use of remote sensing images to define areas under full irrigation by season, south of latitude 29N.	P	Libya	
		Evaluation of Irrigation Systems	Evaluation of the performance of the different irrigation techniques applied in Libya	p	Libya	
		Libya	water	Application of GIS in Irrigation	Use of GIS in the fields of irrigation and drainage.	p
Rehabilitation of Rajmah Irrigation Scheme	Renovating the irrigation equipments, network, water storage at Benghazi area			p	Libya	
Water	South Jabal Akhdar Irrigation Project		Land reclamation and installation of irrigation systems, wells, reservoirs...	P	Libya	
Libya, UN		Shared Aquifer Studies	Water resources assessment, modeling, data base, consultation mechanism	P	Libya	
Libya government		Study and Inventory of Irrigated Areas, Phase II	Use of remote sensing images to define areas under irrigation	P	Libya	
FAONEPAD,	Food security	Food Security Scheme	Objective: to improve national food	P	Libya	

Government, Private Sector		(Wheat, Dates & Olives, Seed Production)	security by increasing production of seeds, wheat, olives and dates. Components: (i) increased wheat production based on rehabilitation and expansion of cropped areas, (ii) increased olive production and processing, (iii) increased date palm production, preparation and storage, and (iv) increased seed production for cereals, vegetables and forage crops.			
Libya government	water	Wadi Derna Water Collection Project	Water collection and storage for water supply purposes	P	Libya	
		Wadi AL-Khalij & AL-Muallaq Dams	Water storage for irrigation and flood protection purposes	P	Libya	
		Wadi Zaghadah and Shuhbayyin Dams	Water storage for irrigation and flood protection purposes	P	Libya	
		Wadi Turghat, Qirrim and Ghanima Dams	Water storage for irrigation purposes	P	Libya	
Libya government UN	Water	Shared Aquifers	Operation of the Regional Centre for Management of Shared Aquifers in Africa (UNESCO Category 2 Centre)	P	Libya	
	Costal	Sea-Water Intrusion Studies	Assessment of current situation of seawater intrusion along the Libyan coast	P	Libya	
	Water	Water Resources Strategy	Updating Libyan Water Strategy (2000-2025) to cover the period (2010-2030)	P	Libya	
Proposed : Government, private sector, foreign investors	Agriculture	Wheat production scheme	Achievement of higher level of self sufficiency of wheat through the expansion of irrigated agriculture, in regions where enough water is available. The project involves 3 parallel phases, which would include expansions through ehabilitation of existing projects, new expansions in existing projects and expansions in new areas.	P	Libya	
Proposed : Government,	Agriculture	Olive production project	Expansion in olive trees planting to meet the national demand for olive	P	Libya	

private sector, foreign investors			oil. The project involves the following components: Olive trees nursery, olive trees farms, extension farms and olive oil processing. It is mainly rain fed production.			
Proposed : Government, private sector, foreign investors	Agriculture	Date palm production project	Expansion in palm trees planting in Libyan Oases and the Coastal Belt to boost the importance of date palm in the agricultural sector. The project involves the following components: Olive trees nursery, olive trees farms, extension farms and dates preparation and storage facilities.	P	Libya	
Proposed : Government, private sector, foreign investors	Water	Great Man Made River GMMR	The project aims at creating a huge network that will supply a total of 6.0mm ³ / day of fresh water, with 30% allocated for domestic and industrial use and 70% to irrigate around 200000 hectares of existing and newly reclaimed agriculture land.	P	Libya	
START GEC Research: Africa	urban	Impact of Urban Growth on Surface Climate: A Case Study in Oran, Algeria	Remote sensing for large/local scale LULCC - How human activity affect the climate	P	Algeria	http://start.org
TIGER ESA Centre National des Techniques Spatiales	Costal zones	Oil spill detection and air quality for the Arzew coast based on satellite imagery. Develop a methodology of environmental assessment and monitoring of marine and atmospheric pollution	relationship between spectral data and in situ data; The interactivity between these various data will allow an optimal exploitation of the areas polluted.	P	Algeria	
TIGER ESA Centre National des Techniques Spatiales - CNTS Association De Recherche Sur Le Climat et l'Environnement	Coastal Zones	Utilisation de la teledetection dans la biosurveillance spatio-temporelle de la pollution cotiere et marine au niveau de la cote occidentale algerienne.	définition des facteurs d'émission, de transit, d'accumulation et d'expansion des polluants en fonction de leur origine (industrielle, agricole, ménagère, domestique,...) conformément aux caractéristiques, océano-météorologiques, géomorphologiques et	P	Algeria	

RSE, Université d'Oran Es Sénia, (Algérie). ARCE, ALGERIE GIP MEDIAS-France (Toulouse). CNTS, Arzew, (ASAL, Alger). CRASTE-LF ISOMer, France). - DISTA MedPol, PNUE (Alessandria, Italie). -AMASMer			océanographiques physiques de l'aire échantillon.			
TIGER ESA University el Jadida	Costal zone	Analyse, qualification et suivi des phénomènes géologiques et hydrogéologiques dans la zone des Doukkala-Abda et son littoral Atlantique: Apport de la télédétection spatiale		P	Morocco	
TIGER ESA CRTS Agence du Bassin Hydraulique de Souss-Massa (ABHSM) Maroc Université Inb Zohr, Agadir Maroc	WATER	Télédétection et Information Spatiale pour la Gestion intégrée des Ressources en Eau dans le bassin hydraulique de Souss-Massa (Agadir, Maroc)	Cette proposition vise à renforcer les capacités de l'Agence du Bassin pour une gestion intégrée des ressources en eau dans le Souss-Massa à travers l'exploitation opérationnelle des données des satellites d'observation de la terre comme sources d'informations dans le processus de gestion des ressources en eau.	P	Morocco	
TIGER ESA Initiave Arab Academy of Science and Technology	Hazards	Risk Assessment of extreme climate events on Alexandria City	- Study of the geological stuctures and surface materials and topography over Alexandria city 2- Identify subsidence areas and magnitude of it and its spatial distributoon over Alexandria 3- Assessment of natural risks such as flooding, earthquakes or damage resulting from sea level rising 4- Study of seismic activities and	P	Egypt	

			geophysical profiles			
TIGER ESA Unité de Recherche en Imagerie Satellitaire et ses Applications Tunisia Institut Télécom / Télécom Bretagne France, CESBIO France,	Hazards Land Environment	Détection et suivi de l'évolution de la salinité des sols en milieu semi-aride : Cartographie de la désertification dans la région de Kairouan (Bassin versant de Merguellil)	détecter le changement de la répartition spatiale des sels et leur évolution dans le temps moyennant l'analyse d'images SAR (Synthetic Aperture Radar) interférométrique	P	Tunisia	
TIGER ESA Ecole supérieure des communications de Tunis CNES - DCT/SI/AR Ecole Nationale Supérieure des Telecommunications de Paris Ecole Normale Supérieure, Laboratoire de Géologie	Land Environment Hazards	.Etude des variations du relief sur le territoire Tunisien par interférométrie	Nous nous proposons d'utiliser la méthode des « Permanent Scatters » (réflecteurs permanents sur des bases de d'images ERS ou ENVISAT) pour étudier ces mouvements. La réalisation des cartes de déplacement donnera également lieu à une étude de la nature physique des réflecteurs permanents	P	Tunisia	

Adaptation – C

Building economic and social resilience (BES)

Organization	Type BES	Relevant focus	Strategies	Programme (Pr)/ Initiative (I)/ Projects (P)	Where in NORTHERN Africa	Website of Organization
Adaptation – C. Building economic and social resilience (BES)						
UNDP / GEF-SGP Community Based Adaptation (CBA) Programme	Building local communities' social/economic resilience	Small-scale projects aim at building on local mobilization to improve economic and social resilience. Adaptation revolving funds are experimented to help local communities invest in adaptation solutions (develop non-agricultural income generating activities; invest in new technologies that will help them adapt to future climate change...)	Community-based adaptation. Building on local participatory vulnerability assessment and on local knowledge, the programme supports small-scale adaptation projects. The lessons learned from these initiatives are shared and disseminated for upscaling and mainstreaming adaptation at national and global levels).	Programme <i>Objective in Morocco : 12 CBA projects by 2011.</i>	Morocco	www.undp-adaptation.org/project/cba
IFAD Ministry of Agriculture, Rural Development and Fisheries United Nations Office for Project Services (UNOPS)	Building local communities' social/economic resilience	Rural Development Project in the Mountain Zones of Errachidia Province	The project's overall goal is to improve the living conditions and incomes of poor households in the mountain zones of Errachidia province,	P	Morocco	http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview
		Rural Development Project in the Eastern Middle Atlas Mountains This project seeks to improve the living conditions of rural populations in one of Morocco's poorest regions. Small-scale farmers, women	A number of different development activities are being pursued: improved natural resource management, rational water use, improved farming techniques, soil and water conservation, rehabilitation of rural tracks, access to rural financial services,	P		
		Livestock and Rangelands Development Project in the Eastern Region – Phases I &II	The main objective is to increase incomes and improve living conditions among rural poor people in the eastern region	P	Morocco	
		Rural Development Project in the Mountain Zones of Al	The project's overall objective is to contribute to the social and economic	P	Morocco	

		Haouz Province	development of poor people in the mountainous zones of Al Haouz province			
:IFAD United Nations Office for Project Support (UNOPS)	Building local communities' social/economic resilience	Rural Development Project for Touarirt-Taforalt holds back agricultural development.	This rural development project in the Touarirt-Taforalt area works to reduce poverty by addressing two major problems that impede development: degradation of rangeland because of poor management and poor use of water resources, and a lack of adapted technology	P	Morocco	http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview
IFAD	Building local communities' social/economic resilience	Tafilalet and Dades Rural Development Project (PDRT)	increase incomes and improve living conditions among rural poor people in the southern region	P	Morocco	
IFAD Government of Algeria United Nations Office for Project Services (UNOPS) IFAD	Building local communities' social/economic resilience	Rural Development Project for the Mountain Zones in the North of the Wilaya of M'Sila women.	This project, designed to reduce rural poverty, focused particularly on small farmers, unemployed young people and rural build local capacity for planning rural development at the grass-roots level, ensure the sustainability of agricultural development and productivity	P	Algeria	http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/1257/project%20overview
		Pilot Project for the Development of Mountain Agriculture in the Watershed Basin of Oued Saf Saf	The overall objective of the project was to contribute to the sustainable socio-economic development and to improve the living conditions of disadvantaged rural people in the mountainous zones of the Wilayas of Skikda and Constantine.	P	Algeria	http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/1257/project%20overview
IFAD United Nations Office for Project Services (UNOPS) Government of Algeria	Building local communities' social/economic resilience	Artisanal Fisheries Pilot Development Project increase basic food production and the availability of food to low-income urban and rural consumers.	A large number of unemployed youths were motivated to take up fishing. The project supported policy changes regarding credit and private involvement in support services. It was a pilot operation, and it was the first time that credit was made available to unemployed youths who were taking up fishing.	P	Algeria	

IFAD Fund for Economic and Social Development (AFESD) Government of Algeria	Building local communities' social/economic resilience	Pilot Project for Integrated Rural Development of the Mellegue Watershed The project was unique in that it supported rural people farming in a shared geographical region in two neighbouring countries.	The project broke new ground by promoting cooperative development and by adopting a group approach to lending, repayment and environmental conservation activities.	P	Algeria and Tunisia	http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview
IFAD Arab Fund for Economic and Social Development (AFESD)	Building local communities' social/economic resilience	Cereal and Livestock Smallholder Development Project in the Wilaya of Tiaret	gradually promoting reduction of fallow land and introducing annual fodder crops in rotation improving soil preparation and harvest operations by increasing the availability of mechanical equipment promoting adequate use of modern inputs such as improved seeds and fertilizers stocking fodder for dry periods upgrading animal health and genetic improvement capacities	P	Algeria	http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview
GEF IFAD	Building local communities' social/economic resilience	MENARID - A Circular Economy Approach to Agro-Biodiversity Conservation in the Souss Massa Draa Region of Morocco	protection of south Morocco ecosystems biodiversity through the promotion of "produits de terroirs" for an economical valorisation in the protected area of Souss Massa Draa. The objectives of this project, in particular the promotion of "produits de terroirs"	P	Morocco	http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview
Ministère de l'Aménagement du Territoire" UNDP and FFEM		"Protection and valorisation of South Moroccan Oasis"	These initiatives should have to work closely in order to propose and to implement common strategies of valorisation and marketing	P	Morocco	
IFAD GEF Agency: UNDP	Social/economic	MENARID Conservation of Globally Significant Biodiversity and Sustainable Use of Ecosystem Services in	Algeria's Cultural Parks The project aims at strengthen the biodiversity protection in Algerian cultural heritage sites, in particular the sites of Tassili and Hoggar.	P	Algeria	
GEF Agency: UNEP	Urban	Integrated Approach for Zero Emission Project Development in the New Town of Boughzoul The new town of Boughzoul	The GoA would like to build an innovative urban management master plan model integrating a zero emission approach.	P	Algeria	http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview

		(200 km south of Algiers) will have 400 000 inhabitants. The project is facing sustainable development challenges with regard to the scarcity of natural resources of new cities with the use of new concepts.	This approach implies a clean energy framework, the development of energy efficiency buildings, drawings of master plans for transport, waste and public lightening. The GoA is seeking technical assistance from UNEP/DTIE.			ria/226/project%20overview
IFAD GEF Agency: World Bank		Integrated and Sustainable POPs Management Project The project proposes to assist Egypt to manage its PCB, Dioxins and Furans (POP produced by combustion of wastes) and obsolete stockpiles.	Use of lesson-learnt from the first phase of the African Stockpile Program on Obsolete pesticide. <i>The project should consider in particular developing a prevention component to avoid the generation of new stock of pesticides building on the on-going work down in Tunisia.</i>	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt
INRA Institut national de la recherche agronomique	Building local communities' social/economic resilience	Integrated Eco systemic approach for optimization of small dams in Morocco: Scenarios Analysis to improve the coping capacities of communities and the resilience of ecosystems to climate changes	The project examines the socioeconomic effects and potential technical shortcomings of the dam. The study was carried out in partnership with communities, elected officials, local administrators and development practitioners.	P	Morocco	http://www.inra.org.ma
Department of the Environment	Building local communities' social/economic resilience	local plans for adaptation	Communication of scientific information on vulnerabilities to local and regional collectivities to enable them to develop local plans for adaptation	I	Morocco	www.minenv.gov.ma
INDH		National Initiative for Human Development (INDH)	Integration of climate change adaptation in the NDH)	I	Morocco	www.indh.gov.ma
Department of Water		Water conservation	Education and public awareness to water conservation	Pr	Morocco	www.water.gov.ma
Department of Water and Ministry of Agriculture		Modern irrigation	awareness of farmers to adoption of modern irrigation	Pr	Morocco	www.water.gov.ma www.madrpm.gov.ma
Department of Water		Water conservation in the installation of dams	programs to accompany the installation of dams for water conservation	Pr	Morocco	www.water.gov.ma
Department of the Environment		North-South transfer	North-South transfer to support the socioeconomic development of	I	Morocco	www.minenv.gov.ma

			Bouregreg Oum Er Rbia and Tensift basins			
Department of Water and Direction of the National Meteorology		Artificial insemination of clouds	Extension of the program of artificial insemination of clouds	Pr	Morocco	www.water.gov.ma www.marocmeteo.ma
Department of Water		Reform	Reform of the Water Act	P	Morocco	www.water.gov.ma
Ministry of Agriculture		Optimal techniques of irrigation	Generalization of optimal techniques of irrigation	Pr	Morocco	www.madrpm.gov.ma
Ministry of Agriculture		Grants and subsidies	Program of grants and subsidies for farmers that convincing	Pr	Morocco	www.madrpm.gov.ma
Ministry of Agriculture		Training and awareness	Program of training and awareness of illiterate farmers	Pr	Morocco	www.madrpm.gov.ma
Department of the Environment		Act	Act to clarify the responsibilities of different authorities involved in coastal	P	Morocco	www.minenv.gov.ma
Ministry of health	Building local communities' social/economic resilience	Training and awareness on health	Training and awareness on the adverse effects of climate change on health	P	Morocco	www.sante.gov.ma
Ministry of health		Hygiene education	Hygiene education and sanitation in rural and urban communities	Pr	Morocco	www.sante.gov.ma
Ministry of health		Epidemic diseases	Capacity building for prevention and response to epidemic diseases	I	Morocco	www.sante.gov.ma
Ministry of health		Training of health personnel	training of health personnel in quantity and quality	Pr	Morocco	www.sante.gov.ma
Ministry of Tourism and		Preservation of tourism	Preservation of tourism facing sea level rise and water scarcity	Pr	Morocco	www.tourisme.gov.ma
IFAD Bureau des Nations Unies pour les services d'appui aux projets Ministère de l'agriculture et des ressources hydrauliques	Building local communities' social/economic resilience	Integrated Agricultural Development Project in the Governorate of Siliana - Phase II	These project rehabilitated a state farm and privatized it by distributing small parcels of the land to small-scale farmers, providing technology transfer and credit services to the farming community. When the projects were completed, the people who benefited agreed, on a voluntary basis, to pay a levy on each feddan of land in order to finance a small unit to manage the irrigation and drainage systems	P	Tunisia	http://operations.ifad.org/web/ifad/operations/country/project/tags/tunisia/1299/project%20overview
		Agropastoral Development and Local Initiatives Promotion Programme in the South-East		P	Tunisia	
		Integrated Agricultural Development Project in the Governorate of Zaghouan		P	Tunisia	
		Integrated Agricultural Development Project in the Governorate of Siliana		P	Tunisia	

		Sidi M'Hadheb Agricultural and Fisheries Development Project		P	Tunisia	
		Sidi Bouzid Rainfed Agriculture Development Project		P	Tunisia	
		Sidi Bouzid Irrigation Project	The projects demonstrated, above all, the success of private smallholder ownership in stimulating agricultural productivity and profitability	P	Tunisia	http://operations.ifad.org/web/ifad/operations/country/project/tags/tunisia/1299/project%20overview
IFAD Ministère de l'agriculture et des ressources hydrauliques	Building local communities' social/economic resilience	Development Project of Small and Medium-Size Farms in the Governorates of Kef and Siliana		P		
		Integrated Agricultural Development Project in the Governorate of Kairouan		P		
IFAD	Building local communities' social/economic resilience	West Beheira Settlement Project	Project results were remarkable. For example, maize yields were three to four times higher than in adjacent areas and among the highest in Egypt. Household income increased fivefold.	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt
IFAD		Minya Agricultural Development Project	The project set up 20 chicken-rearing units and distributed vaccinated birds to small-scale poultry producers, especially women.	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt
		Fayoum Agricultural Development Project focused on five activities: extension and research, irrigation and water management, animal husbandry, farm mechanization, credit and marketing, and technical assistance and training	This project provided a range of agricultural support services in technology transfer, on-farm water management and credit to assist about 35,550 small-scale farming households who settled in the reclaimed newlands. An extensive training programme, including demonstrations and excursions, enabled the majority of farmers to address the difficult realities of farming and settling in the desert.	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt
IFAD KfW Bankengruppe (Germany)		Newlands Agricultural Services Project	Through extension advice, training and credit, the cropping pattern also shifted towards high-value crops. Field crops decreased from 69 to 48	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt

			per cent, and horticultural crops increased from 31 to 52 per cent. In addition, disposable farm incomes almost quadrupled.			
International Development Association (IDA)	Building local communities' social	Sohag Rural Development Project The goal of this six-year IFAD-initiated project is to support a high-priority rural development effort by the government in Sohag,	Control over public-sector resources and investments is being fully decentralized to local administrative units at the village level. Villages are identifying and preparing their own village-level infrastructure investments. The experience that IFAD hopes to gain is expected to provide important insights for other countries in the region, where planning and control of public-sector investments often remain largely under the control of central government ministries.	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt
Source: IFAD partners International Development Association (IDA)	Building local communities' social	East Delta Newlands Agricultural Services Project This seven-year project is being implemented in the recently reclaimed desert lands between the Suez Canal and the Nile Delta that are irrigated by the Al Salam Canal. The main objective is to support the settlement and agricultural production of about 25,500 families. Project initiatives include	building tertiary irrigation and drainage systems providing safe drinking water to needy communities supporting credit banks in extending their operations to the area establishing community organizations that can participate in management of the irrigation system Through these initiatives, the project aims to increase farmers' incomes and provide a basis for development of a viable rural economy in the area.	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt
Source: IFAD Partners Food and Agriculture Organization (FAO)	Building local communities' social	West Noubaria Rural Development Project This seven-year project is working with small-scale farming households and unemployed youth who were dispossessed of their statutory tenancies in the oldlands and compensated with 1-ha or 2-ha holdings of reclaimed newlands	supporting adoption of better on-farm water management practices encouraging development of small and medium enterprises in agricultural production and marketing providing marketing and extension information supporting development of a viable financial system and addressing the immediate need for financing of small and medium enterprises	P	Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt

Source: IFAD Government of Egypt	Building local communities' social	Upper Egypt Rural Development Project	The project will give particular emphasis to gender issues. It will give women the support they need to form marketing associations for livestock and handicraft production, and it will ensure that they have a voice in project activities and decisions.	P	Egypt	
-------------------------------------	--	--	--	---	-------	--

Mitigation – D

Energy Sector

B. FRAMEWORK OF NORTHERN AFRICA CLIMATE CHANGE PROGRAMMES (WORK SHEET- ADAPTATION & MITIGATION)

Organization	Type Energy Sector	Relevant focus	Strategies	Programme (Pr)/ Initiative (I)/ Projects (P)	Where in NORTHERN Africa	Website of Organization
Mitigation – E. Energy Sector						
Trans-Mediterranean Renewable Energy Cooperation TREC	Renewable Energy	DESERTEC is the name of a proposed large scale solar power project. Under the proposal, solar thermal energy collectors (not solar cells) would be located in the	Provide Europe with one sixth of its electricity. It could take 30 years to build, with a cost of more than £200 billion ⁹ . The high solar radiation in the deserts of the Middle East and North Africa outweighs the 10–15%	I/P	North Africa	http://www.nokrashy.net/

⁹ ^ Robin McKie (2007-12-02). "How Africa's desert sun can bring Europe power". [The Observer](#). Retrieved 2007-12-08. (October 2009)

		deserts of North Africa and would provide Europe with one sixth of its electricity.	transmission losses between the desert regions and Europe. This means that solar thermal power plants in the desert regions are more economical than the same kinds of plants in southern Europe			
AQUA-CSP German DLR, NERC, Jordan Univ. Aden, Yemen Univ. Sana'a, Yemen University of Bahrain, A Bennouna, Morocco IFEED, Germany Kernenergien (Germany) Nokraschy Engineering GmbH (NE, Germ and Egypt) Deutsche Gesellschaft Club of Rome HWE, Palestine CSES, Libya CDER, Morocco Univ of Bremen	Concentrating Solar Power for Seawater Desalination	The AQUA-CSP study analyses the potential of concentrating solar thermal power technology for large scale seawater desalination for the urban centres in the Middle East and North Africa (MENA). It provides a comprehensive data base on technology options, water demand, reserves and deficits and derives the short-, medium- and long-term markets for solar powered desalination of twenty countries in the region	The study gives a first information base for a political framework that is required for the initiation and realisation of such a scheme. It quantifies the available solar energy resources and the expected cost of solar energy and desalted water, a long-term scenario of integration into the water sector, and quantifies the environmental and socio-economic impacts of a broad dissemination of this concept.	P	Morocco, Egypt, Libya	http://www.dlr.de/tt/aqua-csp
UE NREA – Egypt New and Renewable Energy Development and Utilization Authority ONEP Morocco Office National de l'Eau Potable PEC	Solar Power And Desalination Plant	MED-CSD: Combined Solar Power and Desalination Plants: Techno-Economic Potential in Mediterranean Partner Countries The MED-CSD project is a project funded by the European Commission – DG Research under the 7th Framework Programme (FP7).	to carry out feasibility studies of power plants combining Concentrating Solar Power (CSP) technology with seawater desalination in the Mediterranean region. to make a technology review and a selection of concentrated solar power and desalination configurations adapted for application in the Mediterranean partner countries. to assess the technico-economic potential of this type of combined generation in the region.	P	Egypt Morocco	www.med-csd-ec.eu
		MED-CSP	. A set of criteria for			

		The scope was to create a database for decision makers showing the potential of renewable energies to solve the regional energy and water shortage and the corresponding cost escalation	sustainability was defined including not only environmental issues, but also socioeconomic efficiency and security of supply. A scenario was developed showing that the growing demand for power and water can be satisfied in an affordable way by a well balanced mix of technologies and resources			
German Federal Ministry for Economic Cooperation and Development (BMZ) Country: Morocco Lead executing agency: Ministry of Energy, Mines, Water and the Environment (MEMEE)	Renewable Energy and Energy Efficiency Promotion	<ul style="list-style-type: none"> •The project advises the Moroccan Ministry of Energy, Mines, Water and the Environment on developing and implementing the nation's Renewable Energy and Energy Efficiency Act and secondary regulation in the form of, for example, ordinances and decrees. •develop regional utilisation strategies for renewable energy sources and energy efficiency •Power grid structures within Morocco 	Promoting Renewable Energy Sources and Energy Efficiency for Sustainable Development in Morocco Forecasted demand will cause Moroccan greenhouse gas emissions, currently still low, to rise considerably. Nevertheless, the nation can succeed in reducing its dependence on energy imports and fostering a more sustainable energy supply by tapping into its enormous potential for renewable energy sources and targeting greater energy efficiency	P	Morocco	http://www.dlr.de/tt/mec-d-csp
German Aerospace Center (DLR, Germany) National Energy Research Center (NERC, Jordan) A. Bennouna (NE, Germany) (NREA, Egypt) (NEAL, Algeria) (IFEED, Germany) Hamburg Institute	Energy	The TRANS-CSP study focuses on the interconnection of the electricity grid of Europe, the Middle East and North Africa (EUMENA) with the purpose of supplying about 15 % of the European electricity demand by solar energy imports from the South by the year 2050	. The conventional electricity grid is not capable of transferring large amounts of electricity over long distances. Therefore, a combination of the conventional alternate current (AC) grid with High Voltage Direct Current (HVDC) transmission technologies will be used in such a Trans-European electricity scheme.	P	Algeria Egypt Morocco	http://www.dlr.de/tt/desktopdefault.aspx/tabid-2885/4422_read-6588
German Development Cooperation	Energy	prove the feasibility of electrical generation from solar	A pre-feasibility study was presented to the Tunisian government in January 2009.	P	Tunisia	http://www.gtz.de/de/dokumente/en-energy-news

Tunisian gas and electricity utility, STEG,		thermal power plants.	Next steps will be the elaboration of a full scale feasibility study to determine the size and location of the first pure concentrated solar power (CSP) plant in Tunisia.			
Energy Audits Sonelgaz	Energy efficiency	On behalf of Sonelgaz, Econoler, through the firm Soprin-ADS, undertook the realization of an energy efficiency audit within an East Algerian company, La Cimenterie de Hamma Bouzaine. This project served as a pilot project to evaluate the potential energy savings in the cement industry	<ul style="list-style-type: none"> •Collection of the actual data on the field. •Identification of potential energy savings measures. •Financial evaluation of the savings and investments with the SYNERGIETM software and other specialized spreadsheets. •Set up of an action plan for the realization of profitable measures. •Redaction of an analysis report. 	Pr	Algeria	
OME Acciona ADEME DLR ESD NERC SONELGAZ S3E	renewable Energy	REMAP - Action Plan for high-priority renewable Energy initiatives in the Southern and Eastern Mediterranean Area	The objectives of the REMAP project are to work with key stakeholders in order to achieve the following objectives: Compilation of a solar and wind energy resource atlas for the Southern and Eastern Mediterranean area; Identifying and prioritising potential demonstration sites for wind	P	Algeria Tunisia	http://www.dlr.de
Agence de l'Environnement et de Maîtrise de l'Energie (ADEME)	Energy	This finance facilitation programme is one of three elements of a comprehensive WSSD Type II initiative "Promotion of Renewable Energy Technologies in the Mediterranean Region" coordinated with the International Energy Agency (IEA) The other two elements of the initiative focus on strengthening policy frameworks and building private sector project	Developing a sustainable renewable energy market system; "Tradable Renewable Certificates"; "Certified Emission Reductions"; Identification of policies and institutional barriers; Feasibility studies for real projects with: - village-scale mini-grids, - renewable energy introduction (mainly solar but also geothermal energy) in the building sector, - desalinating sea water, - increasing agricultural water pumping by solar, wind and biomass	Programme	Egypt Morocco, Tunisia	http://www.medrep.info - http://www.uneptie.org/energy/act/fin/m http://uneprisoe.org/MedREP/details.htm - http://www.rec.org/REC/Programs/ITF

MENAREC Middle East and North Africa Renewable Energy Conference	Energy		MENAREC 1 Yemen 2004 MENAREC 2 Jordan 2005 MENAREC 3 Cairo, June 2006 MENAREC 4 Damascus June 2007 MENAREC 5 in Morocco, beginning 2010			http://www.menarec.org/
NEPAD	Energy	Strengthening Algeria- Morocco-Spain interconnection	laying a 400 kV between Morocco and Spain; erecting 400 kV substations in Morocco, Algeria and an overhead 400 kV line between these substations; and strengthening transmission networks in Morocco.	P	AlgeriaMorocco	
NEPAD	Energy	Algeria gas-fired power station and Algeria-Spain interconnection	Which entails developing a 2000MW of combined cycle gas turbine power plant in Algeria. 40% will be for domestic use and the balance for export to Europe through Spain	P	Algeria	
NEPAD	Energy	Nigeria- Algeria Gas Pipeline	study to investigate the possibility of wheeling Nigerian natural gas through Algerian networks to Europe and how countries through which infrastructure will pass can benefit.	P	Algeria	
Mediterranean Renewable Energies Centre – MEDREC	Energy	Identification and analysis of barriers towards large scale development of renewable energies; Implementation of a database of actors, operators and stakeholders committed in renewable energies market, policy and research; Training, information dissemination and networking	activitiesTechnical studies on “Tradable Renewable Certificates” and “Certified Emission Reductions”; Development of pilot projects in the field of renewable energies; Deployment of financing sources and mechanisms’ options for the financial support of renewable energy (RE) projects; Assessment of the renewable energies technologies situation in the different MEDREC countries;	P	Algeria Egypt Libya Morocco Tunisia	http://www.medrec.org/
the National Agency for Renewable Energy,	Energy	This project encourages the replacement of current conventional street lamps with more efficient sodium high pressure lamps.	replacement of the entire streetlamp inventory in Tunisia over the 2002-2011 period. A portion of this investment is being sought from potential CDM investors, relative to the value of the carbon	Pr	Tunisia	

			reductions generated. Up to 0.323 MTOE of fossil fuel savings can be achieved over the 2002-2011 period.			
ESCO	Development of Energy Service Companies (ESCO) in Tunisia	This project encourages the development of energy service companies (ESCOs) through the creation of a Revolving Fund. ESCOs have the potential to enhance the use of energy efficient equipment across the industrial, commercial, and transport sectors by facilitating access to information, prospective investors, and favorable financing arrangements.	The potential and strategic role of ESCOs has been recognized in ongoing efforts to restructure the energy sector in Tunisia, and has been given prominent consideration. Up to 0.85 MTOE of fossil fuel savings can be achieved over the 2002-2020 period, resulting in 3.7 million tonnes of CO2 avoided.	P	Tunisia	
Tunisian government	Energy	Efficiency Improvements in the Freight Transport System in Tunisia	This project encourages the installation of 5-10 freight transport centers along major thoroughfares. The purpose of these centers is to provide a way for truckers to pick up freight loads on return trips, thereby increasing the overall tonkilometer per energy ratio. Currently, about 40 to 50% of all freight kilometers in Tunisia are associated with an empty haul.	Pr	Tunisia	
STEG	energy	Program for High Efficiency Residential Lighting in Tunisia	The program would work by households applying and receiving a voucher from STEG for the purchase of a maximum of 2 lights per household. Households would then redeem these vouchers through purchase at a local retail supplier. STEG would reimburse local suppliers for the full cost of the vouchers over a 6-month period. Over the 2002-2010 period	Pr	Tunisia	
STEG	Energy	Development of Biogas	This project encourages the	P	Tunisia	

		Energy in Tunisia production of electricity using methane recovered from landfills, large farms, and agro-industries.	Under a incentivized Energy Efficiency and Renewable process in Tunisia, electricity generated in biogeneration facilities will have the legal right to sell electricity to STEG, the national electric utility. The operation of the methane capture and combustion systems will displace about 0.124 MTOE over the 2002-2020 period.			
STEG	Energy	Development of Cogeneration in Tunisia This project encourages the cogeneration of electricity and heat in industrial and commercial facilities	due to the high efficiency of cogeneration relative to current technology, 50% of baseline fossil fuel use will be avoided over the 2002-2020 period. This will result in a reduction of 1.36 million tones of CO2 over this period, all of which will be transferred to the investor	P	Tunisia	
IFAD GEF Agency: UNDP	energy efficiency	Improving the energy efficiency of lighting and building appliances	The project is a follow-up of an earlier GEF funded Energy Efficiency Improvement and Greenhouse Gas Reduction.		Egypt	http://operations.ifad.org/web/ifad/operations/country/project/tags/egypt

Mitigation – E.

Reduced emission from deforestation and forest degradation (REDD) & Land use, land-use change and forestry (LULUCF)

B: FRAMEWORK OF NORTHERN AFRICA CLIMATE CHANGE PROGRAMMES (WORK SHEET- ADAPTATION & MITIGATION)						
Organization	Type REDD & LULUCF	Relevant focus	Strategies	Programme (Pr)/ Initiative (I)/ Projects (P)	Where in NORTHERN Africa	Website of Organization
Mitigation – E. Reduced emission from deforestation and forest degradation (REDD) & Land use, land-use change and forestry (LULUCF)						

COSMART MAROC	forestry	Biodiesl Maroc	Kteco2/an 618,7 Stage PIN	P	MOROCCO	http://www.cdmmorocco.ma
The National Phosphatees Office	forestry	Rehabilitation of open mining sites in Khouribga	Kteco2/an 16,5 Under development	P	MOROCCO	http://www.cdmmorocco.ma
Eucaforest	forestry	Eucalyptus planting	Kteco2/an 67 Under development	P	MOROCCO	http://www.cdmmorocco.ma
The High Commission in Charge of Forest and Combating Desert	forestry	Utilization of argane trees and cacti in the reforestation of semi-arid areas	Kteco2/an 40 Under development	P	MOROCCO	http://www.cdmmorocco.ma
St - Microelectronics	forestry	Reforestation of 10 000ha in the Maamora Forset	Kteco2/an n.d Under development	P	MOROCCO	http://www.cdmmorocco.ma
NEPAD	Combating land degradation, drought and Desertification	Green belt: Conservation and sustainable use of natural resources in the Maghreb countries		P	UMA	
FAO	Land use change and forestry	Desertification Protecting the existing forest ecosystems Biodiversity Sustainable use and management of biodiversity and of natural resources	Forest assessment and mapping. Thematic studies on specific items: wildland fires, forest pests, forest and water, resource tenure, planted forest. Training for national correspondents. Dissemination of results. Regional workshops	P	Algeria, Egypt, Morocco, Tunisia	http://www.fao.org/forestry/site/fra2005
START GEC Research: Africa	Forestry	GEC Research: Africa	Inventory and mapping pine populations in Morocco using satellite data and evaluation of their physiological response to environmental stresses	P	Morocco	http://start.org

Mitigation –F

F. International carbon market

B: FRAMEWORK OF NORTHERN AFRICA CLIMATE CHANGE PROGRAMMES (WORK SHEET- ADAPTATION & MITIGATION)

Organization	Type Carbon Market	Relevant focus	Strategies	Programme (Pr)/ Initiative (I)/ Projects (P)	Where in NORTHERN Africa	Website of Organization
Mitigation – F. International carbon market						
Agence Nationale pour la Maîtrise de l'Energie (ANME)	CDM-SSC-PDD AMS-I.A. ver. 13	The purpose of the project activity, carried out by the National Energy Conservation Agency (ANME), is to improve life quality standard of people in non-electrified rural areas in Tunisia by equipping them with individual photovoltaic kits to meet their basic energy needs	Rural electrification by individual PV systems PV pumping systems installation PV desalination systems installation	P	Tunisia	
Agence Nationale pour la Maîtrise de l'Energie (ANME)	CDM- SSC-CPA solar water heaters (SWH)	The small-scale programme of activities (hereafter referred to as "the PoA") is a programme for the installation of domestic solar water heaters (hereafter referred to as "SWH") in households throughout Tunisia	A typical SSC-CPA employs state-of-the art and recognised solar water heating technology, which converts solar radiation into thermal energy for the heating of domestic water. Due to the simple nature of the equipment it can be considered environmentally safe.	Pr	Tunisia	
Agence Nationale de Gestion des Déchets-ANGED International Bank for Reconstruction and Development (IBRD) as the Trustee of the Italian Carbon Fund (ICF) Italy	Landfill Gas Recovery CDM-PDD ACM0001	Landfill Gas Recovery and Flaring for 9 bundled landfills in Tunisia	Large t eCO2/an 317 909	P	Tunisia	
Agence Nationale de Gestion des Déchets-ANGED	Landfill Gas Recovery CDM-PDD ACM0001	Djebel Chekir Landfill Gas Recovery and Flaring Project – Tunisia	Large t eCO2/an 369 664	P	Tunisia	
ANGED/MEDD	Landfill Gas	Landfills of Tozeur-Mahdia-	PIN approved by DNA	P	Tunisia	

	Recovery	Zaghouan	t eCO2/an 47 619			
ANME	Energy	Solar heating scaling-residential + tertiary	PIN approved by DNA t eCO2/an 57 000	P	Tunisia	
SCG	Energy	Installation of wind farm for electricity production in the GABES Cement plant	PIN approved by DNA t eCO2/an 21 200	P	Tunisia	
CIOK	Energy	implementation of a wind farm near the site of d'Oum el Kébil (CIOK)	PIN approved by DNA t eCO2/an 21 200	P	Tunisia	
ANME	Energy	Rural electrification and water supply by solar photovoltaic	PIN approved by DNA t eCO2/an 1 700	P	Tunisia	
Office du Commerce de Tunisie (OCT)	Energy	Improving energy efficiency by distributing 2 million low-consumption lamps LBC	PIN approved by DNA t eCO2/an 27 600	P	Tunisia	
STEG/industr. Zone Menzel Hayet	Energy	Substitution of petroleum products by natural gas (project Gafsa and Jammel/Zeramdinne and Menzel Hayett)	PIN approved by DNA t eCO2/an 24 000		Tunisia	
STEG/industr. Zone Jammel/Zeramdinne	Energy	Substitution of petroleum products by natural gas (projet Gafsa and Jammel/Zeramdinne and Menzel Hayett)	PIN approved by DNA t eCO2/an 41 600		Tunisia	
CP Gafsa/ANME	Energy	Project of solar drying phosphates	PIN approved by DNA t eCO2/an 35 700		Tunisia	
STEG	Energy	Wind farm of Sidi Daoud (35 Mw)	PIN approved by DNA t eCO2/an 57 700		Tunisia	
ETAP	Energy	Recovery of oilfield associated gas (flaring), Mamoura (Nabeul)	PIN approved by DNA t eCO2/an 380 000		Tunisia	
	Energy	Recovery of associated gas (flaring) oilfield Jebel Grouz (Tataouine)	PIN approved by DNA t eCO2/an 80 000		Tunisia	

SOTIPAPIER	Energy	Installation of a cogeneration in a stationery	PIN approved by DNA t eCO2/an 15 600		Tunisia	
Groupe Poulina	Energy	Installation of cogeneration in 5 companies of the Group Poulina (SNA, Al Mazra, TEC T'PAP, STIBOIS, GIPA)	PIN approved by DNA t eCO2/an 23 530		Tunisia	
Groupe Poulina	Energy	cogeneration in 4 Business Group Poulina (Ceramique Sfax, Complexe Sidi Saleh, STIBOIS -Bir Kasaa, Couvoirs Cédria	PIN approved by DNA t eCO2/an 27 100		Tunisia	
AGRIMED	Energy Biomass Power	Production of electricity from olive pulp Generation (40 MW	PIN approved by DNA t eCO2/an 172 800		Tunisia	
Cimenterie de Jebel Oust (CJO)	Energy	Installation of wind turbines to produce electricity in Cement Jebel Oust (CJO)	PIN approved by DNA t eCO2/an 21 600		Tunisia	
ANME	Energy	Dissemination of 8 million Lamps Low consumption over the period 2009-2012 in Tunisia	PIN approved by DNA t eCO2/an 173 700		Tunisia	
Société Tunisienne de Production de Biodiesel (STP-B)	Energy	Project Recovery vegetable oils and their processing into biodiesel	PIN approved by DNA t eCO2/an 9 550		Tunisia	
Ministère de l'Agriculture	Agriculture and forest	Biocarburants - Jatropha (15 000 ha)	PIN approved by DNA t eCO2/an 136 000		Tunisia	
Ministère de l'Agriculture	Agriculture and forest	forestation (Pinus and Eucalyptus planting) area 15 440 ha	PIN approved by DNA t eCO2/an 400 000		Tunisia	
Ministère de Transport	Transport	Project RFR et Other components - urban Greater Tunis	PIN approved by DNA t eCO2/an 48 000	P	Tunisia	
Lafarge Ciments Lafarge S.A. France	CDM-SSC-PDD AMS-I.D Small-scale Wind power	The project consists of the implementation of a 10.2 MW wind farm near the site of Tétouan II new cement plant.	Promoted by Lafarge Cements company, the project aims at producing electricity from a renewable source, namely wind energy. The generated electricity, estimated at a net producible average of 38.1 GWh/year, will ensure about 50% of	P	Morocco	http://www.cdmmorocco.ma

			the new cement plant electricity demand			
ONE (Office Nationale d' Electricité)	CDM-PDD ACM0002 large Wind power	Essaouira wind power Project	Support sustainable development participation in the carbon market in a way that minimises cost uncertainties and promotes economic growth and investments in low-carbon technology	P	Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité ONE Direction Technique et Ingénierie –Direction de l'Electrification Rurale	CDM-SSC-PDD AMS-I.A. small-scale Renewable electricity	The proposed small scale CDM project comprises photovoltaic kits that supply electricity to the users and is thus applicable for project category 1.A. according to Appendix B of the simplified M&P for small scale CDM project activities.	The purpose of the project activity is to provide 101,500 rural households in all regions of Morocco with photovoltaic kits to enable them to meet their basic energy needs. Therefore, the project involves a minimum of 101,500 households to be equipped with individual PV kits along with the basic installation for domestic electricity use (bulbs, plugs), during the period 2004 to 2008.	P	Morocco	http://www.cdmmorocco.ma
Agence pour l'Amenagement de la vallée du Bouregreg (AABR)	CDM-SSC-PDD AMS-III.G. small-scale Methane recovery & utilization	The purpose of the project activity is to capture and flare the biogas produced at the OULJA landfill. The project aims at investing in a biogas collection system, a blower and flaring system at the landfill site.	The capture and flaring of the landfill gas will avoid emissions of other gases such as hydrogen sulfide (H2S), mercaptans and other odorous compounds which leads to a cleaner environment in the area surrounding the landfill. The capture and flaring of the landfill gas will reduce explosion and fire risks.	P	Morocco	< http://cdm.unfccc.int/Reference/Documents >.
Surac SA UK EcoSecurities Group Plc	CDM-SSC-PDD AMS-I.C Biomass	The Bagasse Cogeneration Plant Project developed by Surac S.A. is a biomass cogeneration steam project located in the Mechra bel Ksiri, Morocco that will supply steam to the sugar refineries owned by Sunabel S.A..	The project will be constructed next to the plant where the steam will be sold to. The project will be supplying 100,000 tonnes of steam during the sugar production campaign that normally lasts from April to June or 100 days each year. It will then be generating approximately 42 tonnes per hour of steam at 28 bar and 375 degrees running continuously.	P	Morocco	http://www.cdmmorocco.ma
Société Briqueterie	CDM-SSC-PDD	SBBC Fuel Switch Project	The project activity will reduce	P	Morocco	http://www.cdmmorocco

Bati Chaouia	renewable energy	The project activity takes place at SBBC Societe Briqueterie Bati Chaouia brick works	greenhouse gas (GHG) emissions by primarily substituting partly body fuel, dryer fuel and kiln fuel from fossil sources to renewable sources at the brick works. The project activity will apply bio-organic matters, like fatty acids as well as nutshells and residual wood.			o.ma
Régie Autonome Multi-Services d'Agadir RAMSA	CDM-SSC-PDD Wastewater Treatment	RAMSA – Biogas recovery and electricity generation from M'zar Wastewater treatment plant, Morocco	The proposed project activity involves the recovery of biogas and the electricity generation from existing lagoons in the M'zar wastewater treatment plant, Agadir, Morocco	P	Morocco	http://www.cdmmorocco.ma
ECOMED GESTION DE DECHETS	CDM-PDD Landfill Gas Flaring	Fes New Landfill Gas Recovery Reuse and Flaring Project	The Project's objective is to maximize the capture and destruction of landfill gas (LFG) from the new landfill site in order to reduce explosions and fire hazard associated with landfill gas, and to reduce the fugitive emissions of the greenhouse gas methane contained in the landfill gas and which contributes to global warming and climate change	P	Morocco	http://www.cdmmorocco.ma
GIE Al Wahdaoui	CDM-PDD Renewable energy	Greenhouse Gas Emission in the Fish Meal Industry in Morocco – Central Steam Production Plant The CDM-project focuses on the centralized steam production for 8 fish meal factories in Laâyoune Plage.	The present project focuses on supply-side measures for fuel saving. For that purpose the existing 24 decentralized fossil fuel boilers will be replaced by a central steam production plant: A solar field, using Fresnel-Technology, will provide baseload energy, one huge HFO-boiler will provide steam for peak demand and night operations.	P	Morocco	http://www.cdmmorocco.ma
Office Chérifien des Phosphates (OCP)	CDM-PDD energy efficiency	Jorf Lasfar heat recovery enhancement for power project	The purpose of the proposed project activity is to increase the amount of heat recovered, in the form of steam, from two lines of sulphuric acid production at the Maroc Phosphore	P	Morocco	http://www.cdmmorocco.ma

			III-IV site of Jorf Lasfar, in order to generate a greater amount of steam, leading to a greater on-site power generation.			
Community of Rabat, Morocco Prepared for the By EcoSecurities in collaboration with Clean Tech	PDD approved by DNA landfill biogas collection and flaring	Rabat Akreuch landfill biogas collection and flaring The project consists of the installation, for the first time in Morocco, of a landfill gas capture and flaring systems of landfill biogas to rehabilitate an existing landfill.	The project will reduce emission reductions by introducing the collection and flaring of combustion of landfill gas as an additional activity in the rehabilitation process of the Akreuch landfill in Rabat eliminate fire risks that are related to the uncontrolled release of methane and bad smells coming from the released associated gas, which are harmful to the local residents.	P	Morocco	http://www.cdmmorocco.ma
NAREVA Holding	PDD approved by DNA Renewable energy	Haouma wind farm project 60 MW	Reduction of GHG emissions in accordance with the objectives of the UNFCC	P	Morocco	http://www.cdmmorocco.ma
LAFARGE - Maroc	PDD approved by DNA Renewable energy	Tétouan cement plant has been registered as CDM project in 2005 under reference number 0042. Lafarge cement is undertaking an extension project of the existing wind farm by installing eleven new turbines	Reduction of the country's imports in hard currency by the use of wind power instead of electricity mainly produced from imported coal, natural gas or oil products ; Reduction of GHG emissions in accordance with the objectives of the UNFCC	P	Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité	Renewable energy	Wind farm Tangiers (140 MW)	PDD approved by DNA	P	Morocco	http://www.cdmmorocco.ma
Office National de l'Eau Potable	PDD approved DNA Renewable energy	Renewable electricity generation by the user & for the grid (type 1-A & 1-D). The project is looking at the installation of a wind mill park to provide the desalinisation plant in Tan Tan with the required energy.	The generated electricity will be partly used in the desalination plant and partly sold to the national grid	P	Morocco	http://www.cdmmorocco.ma
Maroc Phosphore I	Energy efficiency	The project is to improve the	The system allows the increase of	P	Morocco	http://www.cdmmorocco.ma

		efficiency of phosphorus chemical complex I in Morocco in Safi by installing a Heat Recovery System (HRS) in a new manufacturing unit of sulfuric acid.	heat recovery process and production of 60 tons additional steam per hour			o.ma
Commune Urbaine de Marrakech	Solid waste Public landfill	Biogas recovery and flaring/valorization in Marrakesh	NIP approved by DNA		Morocco	http://www.cdmmorocco.ma
Commune Urbaine de Fès	Solid waste Public landfill	Biogas recovery and flaring/valorization Fès	NIP approved by DNA		Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité	Renewable energy	Taza wind farm (100 MW)	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité	Renewable energy	hydroelectric management of the Tanafnit-Elborj (40 MW)	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité	Renewable energy	hydroelectric management of the Tillouguit (32MW)	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma
CIMENTS DU MAROC	NIP approved by DNA Renewable energy	Installation of a 10MW wind farm close to the Indusaha grinding center, approximately 18km distance from Laayoune, 21,6m asl.	The wind farm will support the company in satisfying part of its consumption needs, by using its own wind energy instead of energy from the public grid	P	Morocco	http://www.cdmmorocco.ma
Commune Urbaine de Marrakech	Waste water treatment	effluent treatment in Marrakech : production of electricity from biogas	NIP approved by DNA		Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité	Renewable energy	Parc Eolien de Taza (100 MW)	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité	Renewable energy	Project hydroelectric management of the Tanafnit-Elborj (40 MW)	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma
Lesieur-Cristal	Biomass Energy	Proposed use of waste oil as fuel	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma
Commune Urbaine de Kenitra	Solid waste Public landfill	Biogas recovery and flaring/valorization in Ouled Berja (kenitra)	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma
Targa-aide	Energy efficiency	Generating electricity from renewable energy for an Integrated development of the Ouneine Valley, High Atlas	NIP approved by DNA	P	Morocco	http://www.cdmmorocco.ma

		Morocco				
MAPHAR Sanofia Aventis	Energy efficiency	Energy efficiency measures and energy thermal solar production for hot water MAPHAR Sanofia Aventis	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Union Cérame	Renewable energy	Installation of a cogeneration system to LPG (10 MW) in Union Cerame	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
DIMATIT	Renewable energy	Wind farm DIMAVERT 10 MW	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Caisse de Dépôt de Gestion	Gestion des déchets	Recovery and flaring of landfill biogas El Jadida	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Office Chérifien des Phosphates	Energy efficiency	Change in the treatment of phosphate (dry to wet) and Pipe Youssoufia - Safi	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
LAFARGE - Maroc	Renewable energy	First Windfarm extension of the Lafarge cement Tetouan (10 MW)	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Association de l'Industrie Hôtelière	Energy efficiency	Biomass cogeneration: electricity network and hot water: 40 hotels Marrakech	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Tangeir Industrial Zone Association AZIT	Renewable energy	2MW wind-energy for a plastic firm in Tangiers	PIN under development	P	Morocco	http://www.cdmmorocco.ma
Tangeir Industrial Zone Association AZIT	Efficacité énergétique	A2x10 MW win energy at the Tangiers Industrial park : Dalia 1 and Dalia 2	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
ECOMED GESTION DE DECHETS	Solid waste Public landfill	Biogas recovery and flaring/valorization in Mediouna (Casablanca)	PIN under development	P	Morocco	http://www.cdmmorocco.ma
Communes Rabat et Marrakech	Energy efficiency	Installation of 350 000 electronic power cut-out LBC	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Office Chérifien des Phosphates	Energy efficiency	Recycling seawater (Jorf Lasfar)	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Renault Maroc	Biomass Energy	alternative Use of biomass energy	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
MANAGEM	Renewable energy	Recovery of waste heat and cogeneration (4 MW) by the	PIN in progress	P	Morocco	http://www.cdmmorocco.ma

		valorization of the pyrrhotite				
Cellulose du Maroc	Waste	reducing methane emissions from the wastewater treatment plant of pulp Cellulose in Morocco	The Project activity will achieve greenhouse gas (GHG) emission reductions by avoiding OF methane emissions	P	Morocco	http://www.cdmmorocco.ma
Office National de l'Electricité	Energy efficiency	Program for domestic lighting by low consumption lamps (LBC) ten million lamps Program	PIN in progress	P	Morocco	http://www.cdmmorocco.ma
Association de la Zone Industrielle de Tanger AZIT	Renewable energy	Speed variation at the level of compressed air : 20 industries within the plastic sector	PIN in progress	P	Morocco	http://www.cdmmorocco.ma GEMTECH-EESD gemtech@gemtech.ma
	Gestion des déchets	Lighting-efficiency in 40 textile industries	PIN in progress	P	Morocco	
ECOMED GESTION DE DECHETS	Gestion des Solid waste under development	biogas recovery and flaring valorization (Mediouna) Casablanca	The project will reduce emission reductions by introducing the collection and flaring of combustion of landfill gas as an additional activity in the rehabilitation process of the casablanca Mediouna landfill	P	Morocco	http://www.cdmmorocco.ma
Office Chérifien des Phosphates	Energy Efficiency under development	Change in the treatment of phosphate (dry to wet) and Pipe Khouribga - Jorf Lasfar		P	Morocco	http://www.cdmmorocco.ma
NAREVA Holding: was created in 2005 by ONA Group to manage its activities in the energy and environment sector.	(CDM PDD) Renewable energy	Foum El Wad Wind Farm Project	The Project activity will achieve greenhouse gas (GHG) emission reductions by avoiding CO2 emissions from the business-as-usual scenario: electricity generation of power plants connected into the Moroccan grid.	P	Morocco	http://www.cdmmorocco.ma
NAREVA Holding	Renewable energy (CDM PDD)	Akhfenir Wind Farm Project – Morocco The objective is to use wind resources to generate renewable electricity to supply	The Project involves the installation of 87 turbines, each of which have a capacity of 2.3 MW, providing a total installed capacity of around 200 MW. Installed in one of the windiest areas	P	Morocco	http://www.cdmmorocco.ma

		NAREVA's clients in the context of the new regulatory framework in Morocco (the new Law 16.08) and "EnergiPro" program.	of Morocco, with an average wind speed registered at 8.5 to 9 m/s, the Project is expected to generate around 782 GWh per year.			
The Fez Urban Commune RADEF	Solid waste Public landfill	Recuperation and bio-gas burning in Fez	PIN underdevelopement	P	Morocco	http://www.cdmmorocco.ma
Office National des Aéroports (ONDA)	Renewable energy CDM-SSC-PDD)	Electricity supply by photovoltaic solar energy of airports in Morocco	The project consists of installing photovoltaic solar micro-plants for the production of electricity and its injection in the local network of the principal airports terminals areas of Morocco (Casablanca, Marrakech, Tanger, Oujda, Rabat-Salé)	P	Morocco	http://www.cdmmorocco.ma
Ministry of Transport, National Authority for Tunnels	Transportation	Line 3 Greater Cairo Metro Network	The 3rd line includes 29 stations. The technology to be employed is similar to the previously used upon establishment of line 1 & line 2	P	Egypt	
Ministry of Transport Tramway Rabat Société Tramway de Rabat-Salé » (STRS)	Transportation	Tramway and Metro	installation and fitting out of fixed equipment for all systems on line 1 phase 1 of the Rabat-Salé, Marrakesh tramways and Casablanca Metro	P	Morocco	
Entreprise du Métro d'Alger (Algiers Metro Company - EMA) has awarded the SYSTRA /RATP	Transportation	Metro Algiers	Development consortium the contract to provide assistance with the follow-up of design studies, installation and fitting out of fixed equipment of the Algiers metro. This includes stations, rolling stock and workshops.	P	Algeria	
CArbon Egypt Ltd. Kommunalkredit Public Consulting GmbH	CDM N2O decomposition	N2O decomposition	CDM-PDD AM0028 large	P	Egypt	
Onyx Alexandria for Complementary Services in Waste Treatment S.A.E Spain, Ministerio de	CDM Methane recovery	Methane recovery & utilization Support sustainable development	Landfill gas flaring CDM-PDD ACM0001 large	P	Egypt	

Medio Amgiente Veolia Proprete						
New and Renewable Energy Authority Japan Bank for International Cooperation, Japan Carbon Finance Ltd.	CDM Wind power	Development of Wind Energy for Electricity Generation in	CDM-PDD ACM0001 large	P	Egypt	
Alexandria Carbon Black Company S.A.E.	CDM Waste gas/heat utilization	Carbon Black production process generates waste gas as a by-product & utilizes this energy to generate electricity & steam for its captive requirement	CDM-PDD AM0032- Methodology for waste gas or waste heat based cogeneration system large	P	Egypt	
IDEA – Egypt Canada PEI - Europe	Fuel switch	Support sustainable development	Fuel switch to natural gas CDM-PDD AC M0009 large	P	Egypt	
Abou Zaabal Company for Fertilizers	Energy Efficiency PIN	Waste Heat Recovery GHGs: Carbon Dioxide electricity production from waste energy recovery in an industrial or manufacturing process- proposed new methodology NM 0088	Certified Emission Reductions (CERs) Abou Zaabal Fertilizers is owned by Polyserve Fertilizers and Chemicals group he project aims at increasing the capacity of the cogeneration unit to 11 MW where the excess electricity produced will replace current consumption of the old plant from the grid which amounts to 4.7 MW. The remaining 2.3 MW will be exported to the grid	P	Egypt	
New & Renewable Energy Authority (NREA) KFW of Germany	Renewable Energy PDD	Zaafarana 140 MW Wind Power Plant	The yearly CO2 abatement in 2005 reached about 290,000 tCO2e.	P	Egypt	
New & Renewable Energy Authority (NREA) implemented in cooperation with Spain.	Renewable Energy PDD LS	Zaafarana 85 MW Wind Power Plant	It is an 85 MW wind power generation project located in an area with favorable wind conditions expected to have a capacity factor of around 45% resulting in about 335,000 MWh of electricity annually.	P	Egypt	
New & Renewable	Renewable Energy	Zaafarana 80 MW Wind	Title of the baseline: ACM0002:	P	Egypt	

Energy Authority (NREA)	PDD	Power Plant	Consolidated Baseline Methodology for Grid – Connected Electricity Generation from Renewable Energy Sources.			
New and Renewable Energy Authority NREA	Renewable Energy PIN	Integrated Solar Combined Cycle Power Plant (ISCC-Kuraymat)	The most discussed technical concept is to oversize the steam turbine as to operate with an increased amount of steam during solar operation. The waste heat of the gas turbine is used for preheating and superheating, while the solar heat is mainly used for steam generation.	P	Egypt	
The Aluminum Company of Egypt	Renewable Energy PIN LS	Kuraymat Integrated Solar Combined Cycle Power Integrated Solar Combined Cycle System (ISCCS)	The project will implement the best available proven technology to reduce emissions of GHGs through reducing the time of cell upset (anode effect).	P	Egypt	
The Aluminum Company of Egypt	Industry PIN	Perfluorocarbon's Emissions Reduction The project will implement the best available proven technology to reduce emissions of GHGs through reducing the time of cell upset (anode effect).	It is proposed to install a new algorithm to avoid/minimize what is called "Anode Effect". During the aluminum smelting process perfluorocarbons (PFCs), tetrafluoromethane (CF4) and hexafluoroethane (C2F6) are produced during brief process upset periods, anode effect.	P	Egypt	
Nitrous Oxide Emission Reduction in Nitric Acid Unit	Industry PIN	Nitrous Oxide Emission Reduction in Nitric Acid Unit	The project activity proposed is to introduce a new basket of specific catalyst to decompose nitrous oxide gas into its elements nitrogen and oxygen. The decomposition contribution to GHG mission reduction of more than 75,000 ton CO2 equivalent per year for the duration of the project activity.	P	Egypt	
El Delta Company For Fertilizers and Chemicals Industries	Industry PIN	Emitted CO2 Utilization in Urea Fertilizers Industry & Tail Gas Flaring Delta Company for fertilizers	Title of the baseline: New baseline methodology Justification of baseline scenario: • Reuse the emitted CO2 from Ammonia unit at Talkha 1 to	P	Egypt	

		and chemical industries includes two production plants for urea fertilizer manufacturing (Talkha 1 and 2	urea production line in Talkha 2 plant (the same company) • Flaring of the released tail gas (1200 m3/hour) containing 8% CH4			
National Cement Company	Industry PIN	Fuel Switching & Reduction of Clinker Content in Cement	Fuel switching and installation of additional homogenizing facilities, hoppers, weigh feeders and transportation equipment such as loaders, belt conveyors etc.	P	Egypt	
Dyeing Materials & Chemicals (ISMADYE) Company	Energy Efficiency PIN	Technology Upgrading and Fuel Switching	The project involves the installation of internal and out of fence NG network, natural gas-based burners and automatic control system for the burners. Replacement of HO-based boilers with NG-based boiler and fuel switching	P	Egypt	
Tensif Region Development Centre CDRT	Fuel Switching	potter Kilns in Marrakech	Educating potters to use gas-powered kilns around Marrakech rather than burn tires. CDRT helped co-finance 22 kilns, which reduced harmful CO2 emissions by 12,000 tons.	P	Morocco	
Alexandria for Oil & Soap	Fuel Switching PIN	Fuel Switching in Boilers, Dryers and Furnaces	The project involves installation of internal and out of fence NG network, natural gas-based burners and automatic control system for the burners. Brief description of technology:	P	Egypt	
Misr Beida Dyers Company	Fuel Switching	Fuel Switching for Electricity Generation and Industrial Processes (I)	The steam is used for electricity generation and for production purposes. The project involves installation of internal and out of fence NG network, natural gas-based burners and automatic control system for the burners.	p	Egypt	
Misr Fine Spinning & Weaving	Fuel Switching	Fuel Switching for Electricity Generation and Industrial Processes (II) The project aims at switching of four	The project involves the installation of internal and out of fence NG network, natural gas-based burners and automatic control system for the	p	Egypt	

		steam boilers operating on heavy oil to natural gas.	burners. Brief description of technology: Fuel switching			
CEMEX Egypt (Assiut Plant)	Waste PIN	Biomass Fuel Switching The plant will utilize biomass cultivated from a farm owned by Cemex Egypt which is located near the plant.	Reduction of CO2 emissions through partial fuel substitution. The biomass will be transported to the cement plant through belt/screw conveyor after being screened and grinded.	P	Egypt	
Egyptian Environmental Affairs Agency (EEAA)	Afforestation PIN LS	Greater Cairo Ring Road Project The proposed project will help improve the quality of air in Egypt as it has been severely degraded by car exhaust and industrial emissions.	The forest that will be planted will be irrigated by treated sewage water and will absorb 100,000 tons of CO2eq annually. The methods applied will be based on the long technical experience of NFA on forest regeneration.	Pr	Egypt	
Sonatrach	CDM In progress	Capture and transport of currently flared associated gas from the Ohanet field in the southeast area of Algeria The purpose of this project is to capture and transport associated gas to market from six reservoirs in the Ohanet field in Algeria so as to eliminate the current flaring for this gas	The project will support the country's overall development and sectoral policies in that the gas will be used productively downstream and totally eliminate the flaring on-site. - CO2emissions reduction will be approximately 5.7 million tons of CO2equivalent and a dehydration unit	P	Algeria	http://cdmalgeria.org/

C. Supporting and Enabling Measures:

Capacity building; Finance; Technology development and transfer

C: FRAMEWORK OF NORTHERN AFRICA CLIMATE CHANGE PROGRAMMES (WORK SHEET- SUPPORTING AND ENABLING MEASURES)						
Organization	Type CB; F; and TDT	Relevant focus	Strategies	Programme (Pr)/ Initiative (I)/ Projects (P)	Where in NORTHERN Africa	Website of Organization
C. Supporting and Enabling Measures: Capacity building (CB); Finance (F); Technology development and transfer (TDT)						

UNDP / GEF-SGP Community Based Adaptation (CBA) Programme	Capacity Building and Finance	Capacity-building and community mobilization are key project planning and implementation tools for adaptation. Adaptation revolving funds are experimented to help local communities invest in adaptation solutions (develop non-agricultural income generating activities; invest in new technologies that will help them adapt to future climate change...). The CBA programme funds community initiatives , and provides civil society organizations with training, project methodology support, etc.	Community-based adaptation. Building on local participatory vulnerability assessment and on local knowledge, the programme supports small-scale adaptation projects. The lessons learned from these initiatives are shared and disseminated for upscaling and mainstreaming adaptation at national and global levels). Supporting and enabling measures are implemented at local level (with community-based organizations, NGOs, municipalities...), and also at national level (promoting adaptation with national stakeholders, mainstreaming adaptation in national programmes...).	Programme <i>Objective in Morocco : 12 CBA projects by 2011.</i>	Morocco	www.undp-adaptation.org/project/cba
Sahara and Sahel Observatory, Tunis, Observatoire du Sahara et du Sahel (OSS)	CB TDT	Strategy 2010	international initiatives that contribute to sustainable development in Africa, especially the <u>Millennium Development Goals (MDGs)</u> and the <u>New Partnership for Africa's Development (NEPAD)</u> .	Pr	Algeria Egypt Morocco Tunisia	http://www.oss-online.org
		Strategy 2010 : A scientific and technical axis	– Joint management of shared water resources with a view to enhancing their governance by helping riparian countries upgrade knowledge and devise strategies and tools for effective cooperation. – Environmental monitoring aimed at strengthening OSS member countries' capacity to collect, process and disseminate information for sound decision-making—notably by helping individual countries to set up national environmental monitoring and observation mechanisms			
		Strategy 2010 :	Aimed at rallying active support from			

		A Research for Development axis	Africa's scientific community to two strategic themes: joint management of shared water resources and environmental monitoring		Egypt Morocco Tunisia	online.org
		Strategy 2010 : An information axis	aims to give impetus to actions undertaken by members by generating synergies and fostering partnerships within the OSS community.			
OSS Swiss Agency for Development and Cooperation (SDC)	CB	establishment and strengthening of national mechanisms for environmental surveillance « Dispositifs Nationaux de Surveillance Environnementale », DNSE	The objective of the DNSE project is to initiate, establish and/or strengthen national mechanisms for environmental surveillance as part of the evaluation and monitoring systems for National Action Programmes to Combat Desertification (NAP/CD) in four OSS member countries: Algeria, Mali, Niger and Tunisia.	P	Amgeria Tunisia	http://www.oss-online.org
ROSELT-OSS SDC Ministry of Foreign Affairs France FFEM), The French global environment fund France Ministry for Ecology and Sustainable Development France CNTS, Algeria. ASAL, Algeria	CB	The project, known officially in French as "Utilisation des données ALSAT1 pour l'élaboration de spatio-cartes et l'analyse de l'évolution de l'occupation des sols dans la zone d'action de l'OSS" aims at improving environmental surveillance in the OSS area. It will do this through maximising the use of data from Alsat-1 for the development of space maps and analysing land use trends in the area.	The initial phase from end-2006 to early 2007 has focused on the diachronic mapping of land use in six observatory sites involved in the ROSELT-OSS network, located in the Sahel Leading up 2008, the second phase focuses on the development of a map mosaic of the OSS area, on a scale of 1:5000000.	P	Algeria Tunisia Morocco	http://www.oss-online.org
Sahara and Sahel Observatory, Tunis, Observatoire du Sahara et du Sahel (OSS)	CB TDT	Contribution to the implementation of the NEPAD environment component by focusing on the mastery of useful information for decision-making	-Combating desertification and mitigating the effects of droughts: -Preventive management of foreseeable impacts of climate changes, -Sound management of transborder natural resources:	Pr	Algeria Egypt Morocco Tunisia	
Global Facility for	CB	The objective of this activity is	Primary Nature: Institutional	P	Algeria	http://gfdrr.org

Disaster Reduction and Recovery GFDRR		to place disaster risk management on the development agenda for the MENA Regional VP.	Capacity and Consensus Building for Disaster Risk Reduction (Includes Advocacy and Training) Secondary Nature: Knowledge and Capacity Enhancement for Disaster Risk Reduction Expected Outcomes: An established DRR unit in the organization Output Indicators: Organizational development Primary Deliverable: Analytical Publications, incl. formal ESW and AAA		Egypt Libya Morocco Tunisia	
START Swedish International Development Cooperation Agency (Sida)	CB	Building Long-Term Capacity for Managing & Adapting to CC in Africa The program aims to convene and enhance the capacity of national level interdisciplinary resource groups that will include representatives from universities, scientific research institutes, government, industry, NGOs, and others. The program's main objectives are as follows:	a brief scoping study that assessed targeted countries' current education and training capacities for improving research and understanding of vulnerability, adaptation and resilience to climate risks and their relevant capacity building priorities	Pr	Egypt Morocco	http://start.org/programs/building-long-term-capacity-africa
GTZ Ministry of Agriculture and Water Resources (MARH); General Directorate of Agricultural Studies and Development (DGEDA)	CB TDT	Adaptation to climate change: development of a national strategy for agriculture, ecosystems and water resources in Tunisia April 2005 to December 2007	Development of a Strategy for Adaptation to Climate Change in the Tunisian Agricultural Sector. The adaptation strategy and action plan for the agricultural sector were coordinated and agreed with all relevant sectors and institutions. It became apparent that the climate problems cannot be resolved by the agricultural sector alone but require a coordinated inter-sectoral approach.	P	Tunisia	http://www.gtz.de/de/dokumente/en-climate-results-maghreb
CCAA CDRT	CB	Climate Change in the Maghreb : Threshold and limits	Participants identified the followings potential actions to better cope with	I	Morocco	www.ucam.ac.ma/ccam

UCAM OSS Diversitas Maroc IDRC DFID		to adaptation	the threat of transformative change: Develop Better Threshold Knowledge; Monitor Multiple Driver; Reduce Other Stressors; Manage Threshold Shift; Project Impacts to Water Supply, Biodiversity, and Resource Extraction; Instigate; Institutional Change to Increase Adaptive Capacity Identify Recommendations for Monitoring and Research			
GTZ Ministry of the Environment and Sustainable Development, Ministries of Agriculture and Water Resources, Public Health, Tourism, and Industry and Energy; the private sector	CB TDT	Clean Development Mechanism (CDM) Capacity Development in Tunisia: undertaken as part of the „Implementation of the United Nations Framework Convention on Climate Change in Tunisia“ programme Jan 2006 to Dec 2008 The implementation of the UNFCCC in Tunisia programme focusses on two aspects: greenhouse gas emissions reduction and adaptation to climate change.	These practice-oriented training models have raised awareness of the CDM among stakeholders who play a key role in the development of CDM projects. To date, around 80 people have participated in training. Support has also been provided to enable a number of Tunisian government representatives to attend the Carbon Expo in Cologne and the United Nations Climate Change Conference in Nairobi in order to boost their knowledge of trends and actors in the carbon market.	P	Tunisia	http://www.gtz.de/de/dokumente/en-climate-results-maghreb
MEDREC The Mediterranean Renewable Energy Centre (MEDREC) in Tunis	CB	The main focus of the centre is the sector of wind and solar energy; sectors related to mini-hydro, geothermal, biomass and fuel-cells will also be considered..	MEDREC is a Centre of excellence for training, information dissemination, networking and development of pilot projects in the field of renewable energies, and represents the operational tool and reference point for the implementation of MedREP in the region	Pilot Projects	Egypt, Algeria, Tunisia, Morocco	http://webapps01.un.org/dsd/partnerships/public/partnerships/193.html & http://www.medrep.it Under construction
GTZ Moroccan State Secretariat of	CB	A precondition for the success of the CDM will be ensuring that there are reliable framework	The result of the study demonstrates that the CDM basically contributes to the financing of renewable energy projects. However, the real	P	Morocco	http://www.gtz.de/de/dokumente/en-climate-results-maghreb

Environment Morocco: Clean Development Mechanism		conditions for private and public players and appropriate supervision. The advanced reform of the Moroccan energy sector has created favourable conditions for the country's future involvement in the CDM. June 1998 - May 2001	effectiveness of the process is only assured under certain conditions. Strict application of additionality criteria will result in a rather low number of potential projects.			
The African Climate Change Fellowship Program START (ACCFP) Co-Host institutions Universty Cadi Ayyad Marrakech and Centre de Développement de la Région de Tensift (CDRT)	CB TDT F	The African Climate Change Fellowship Program (ACCFP) offers experiential learning, education, research and training opportunities to African professionals, researchers and graduate students that will build their capabilities for advancing and applying knowledge for climate change adaptation in Africa.	Fellows receive grants that enable them to undertake Policy, Post-Doctoral, Doctoral or Teaching Fellowships. The Fellows visit Host Institutions to implement a project of their own design that enhances their understanding of climate risks, vulnerabilities and adaptation strategies, assesses current practices for designing and implementing adaptation projects and/or promotes integration of adaptation with planning, policy and decision-making.	Pr	Morocco	http://start.org/programs/accfp
Ecole Nationale Forestière d'Ingénieurs (ENFI)	CB TDT	Crosscutting Issues, Gender This research project will develop capacity for, and contribute to, policy and decision-making for strategic coastal land use planning and management, to the purpose of reducing the vulnerability of coastal communities to the impacts of sea level rise, coastal flooding, and related extreme weather events.	assess population vulnerability to, and socio-economic consequences of, climate change impacts arising from sea level rise, coastal flooding, and associated extreme weather events develop local capacity for multi-stakeholder, participatory policy and planning processes (lead ENFI, contributors MATEE, Local NGOs and local collectivities, University of Moncton, PIK, EUCC)	P ACCMA	Morocco	http://www.pik-potsdam.de/~kropp/acma/index.html
Libya government UN	CB TDT	Hardware, and Publications Laboratory and Field Equipments, software ,	Upgrading and renewal of laboratories, equipments and computer facilities	P	Libya	
Drynet	CB	Strengthening civil society	-Building capacity for participation	I	Morocco	www.dry-net.org

ENDA TM Senegal/Madagascar/ Morocco	TDT	networks to address dryland degradation and poverty issues in the context of strategic development frameworks and the UNCCD	and project development -Knowledge & science, technology and institutions identifying best practices and innovations -Communication in and beyond the network			
International Development Research Centre IDRC	CB TDT	Reducing vulnerability to the effects of sea level rise, with its accompanying flooding. Sustainable development and land use strategies.	Demonstrate the value of stakeholder participation in evaluating the trade-offs between adaptation options in the stretch between Ras El Bar and Gamasa on the northern coast of Egypt. Build capacity through technology transfer, awareness raising, workshops, training exercises and institution strengthening.	P	Egypt	http://www.idrc.ca
WB Sonatrach	CB	Capacity building in developing CDM projects Learning by doing : developing one CDM pilot project A consultant was hired by World Bank to assist Sonatrach in this project	A guidebook and operational manual for establishing DNA Preparation for establishing of a DNA Organization Deliverables Identification of potential CDM projects Prepare a project Development Document A template for a Project Idea Note (PIN)	P	Algeria	http://cdmalgeria.org/
INRA-IRDC	CB TDT	Research and capacity building program on water, health and climate change.	training, support and feedback from IDRC program staff. produce innovative options and evidence-based strategies for coping with the impact of climate change on the health and livelihoods of the poor.	P	Morocco	http://www.inra.org.ma
Libya, UN	CB	Capacity Building	Training GWA staff members in different fields of water resources management	P	Libya	
Sonatrach	CB	"CD4CDM ALGERIE" Lay basis for the creation of a Designated National Authority (DNA) Create a Process to develop CDM projects	5 Project idea notes (PIN) were examined One project was selected (Ohanet), and for which a Project Development Document (PDD) has been made.	P	Algeria	http://cdmalgeria.org/
DESERTNET	CB	Implementation of a Platform	oCapacity building	P	Algeria	

	TDT F	of Services to combat desertification and drought through a system of pilot actions in the Mediterranean Regions Protecting the existing forest ecosystems	oCombating erosion and sand dunes deposit oData collection, analysis, monitoring oIncreasing water availability oNetworking, participatory processes and partnership building		Egypt Morocco Tunisia	
The World Bank - Metap Regional Facility (Metap) Agence Nationale de Protection de L'environnement (ANPE)	CB TDT F	Regional Solid Waste Management Project in METAP Mashreq and Maghreb Countries Project activities are carried out at both regional and national levels.	six training manuals on the different aspects of improved SWM.National level to bring assistance and support to municipal capacities for applying and monitoring the strengthened legal framework, in selecting preferred SWM systems and in negotiating private sector contracts.	P	Algeria Egypt Morocco Authority Tunisia	http://www.smaponline.net/EN/index.php?s ..
Funded by Heinrich Boell Foundation, HSBC, individual donors and IndyACT,	CB, F, TDT	Arab Climate Campaign Climate Change (projects) 2008 - 2012 The campaign includes increasing understanding of climate change among relevant stakeholders and general public, as well as, producing climate policy papers to be used in advocating change	- Communication material for general public - Producing scientific reports on climate change impacts - Workshops, conferences on climate change policy - Networking with other NGOs in the region	P	Algeria Egypt Morocco Tunisia	http://www.indyact.org/environmental.php
Assessments of Impacts and Adaptations to Climate Change (AIACC),	CB, F, TDT	Assessment of Impacts, Adaptation, and Vulnerability to Climate Change in North Africa: Food Production and Water Resources	The study concludes that the involvement of the rural population and extension services in capacity building programs is an essential adaptation measure, with information flows among and between these two groups of stakeholders.	P No. AF 90		http://www.clac.edu.eg
TREC POSEIDON 2006-2010	Technology Transfer and Adaptation	The Trance Mediterranean Renewable Energy Collaboration and regional energy structure (TREC), an initiative of Club of Rome, has launched 2004 a Project Study	This concept aims at planning, optimizing, designing and building a first plant for solar electricity generation and seawater desalination (POSEIDON), based on concentrating solar	P in progress	North Africa	

		"Concentrating Solar Power for Mediterranean Region (MED-CSP)"	thermal power (CSP) technology in a MENA coastal area with arid or semi-arid climate,			
TIGER ESA Initiative	TRANSFER	GOCE gravity field processing by robust techniques Objective is to test robust methods such as (Huber's M-Estimator and R-Estimators) in their robustness properties and computational time comparable to the standard least squares approach by using optimized algorithms.	<ul style="list-style-type: none"> - Precise orbit determination of GOCE by using GPS and precise Earth gravity model (like GGM02) - Preparation of normal matrix - Regularization - Selection of adequate robust method of estimation (computational time, reliability and efficiency are the criterions for the best selection of method) - Estimation of unknown parameters (Spherical harmonic) and the associated variance-covariance matrix. 	P	Algeria	
TIGER ESA Initiative National Centre of Space Techniques	TDT	The main objective of the proposed project is to investigate novel methods exploiting the full polarimetric mode of ALOS PALSAR instrument in earth terrain components classification in the framework of Announcement of Opportunity for ALOS ADEN data for scientific research. The studied area located in the North-West of Algeria was chosen to be representative of different land cover.	<p>The estimated project duration is about two years.</p> <ul style="list-style-type: none"> - Project Preparation : Literature survey and review - Data acquisition : Data will be requested for non-default mode acquisitions during Cycle 7. - Acquisition of further ground truth data. - Data processing and analysis : will start with the reception of the data. - PALSAR polarimetric processing. - Development of methods for land cover classification. - Analysis and interpretation of the results. - Writing of final report. 	P	Algeria	
TIGER ESA Initiative Centre National des Techniques Spatiales - CNTS	TDT	Contribution of the satellites data (radar and optics) for the hydrogeologic prospection in arid region : Case of Tindouf (SW-Algeria) The Methodology proposed is	<p>Geologic and hydrogeologic analysis of the study area ;</p> <ul style="list-style-type: none"> - set up of geographic information system ; - Selection of the remote sensing data ; - Acquisition of spatial data ; 	P	Algeria	

		based on the fusion images techniques of SAR (AP SAR/ALOS and ASAR/ envisat) and optical data [landsat TM, SPOT XS, AVNIR and PRISM (ALOS), Alsat-1 (Algerian satellite).	<ul style="list-style-type: none"> - preprocessing (geometric, radiometric, despeckle, ...) ; - specific digital processing (fusion,multispectral and textural classification,..); - cartography of the new favorable areas of water ressources 			
TIGER ESA Universite des Sciences & de la Technologie- USTHB	TDT	Utilisation en synergie de données multisources pour la caractérisation et l'évolution des états des surface des sols, application aux régions d'Alger et de Laghouat (développement de méthodes de traitement d'images par l'exploitation des données radar SAR des satellites ERS-1, ERS-2 et ENVISAT ainsi que les données optiques MERIS du satellite ENVISAT.	P	Algeria	

ANNEX 2. LIST OF PERSONS CONTACTED

ALGERIA

Mourad BRIKI
Forest Conservation of Batna,
Forest General Direction, Algeria
brikatmane@yahoo.fr

Leila HOUTI
Centre National de Recherche
en Anthropologie Sociale et Culturelle
Acronym CRASC
Street Address 1 Rue Bahi Ammar
Es.Senia Oran Algeria 31000

Dalila NEDJRAOUI
Université des Sciences et
de la Technologie d'Alger

Mohamed SENOUCI
L'Institut Hydrométéorologique
de Recherche d'Oran Algérie
mseouci@wissal.dz

Sebastian Veit
Senior Climate Economist
s.veit@afdb.org
African Development Bank (OSUS)
PH: +216.7110-2784
Cell: +216.2063-4703
Skype ID: globalnaso1
dnedjraoui@yahoo.com

EGYPT

Essam Hassan Mohamed Ahmed
Consultant Engineer; Climate change Expert
Egipitian Environmental Affairs Agency
+2101015113933
esamhasan62@yahoo.com

Guy JOBBINS

Adaptation in Africa Program,
Middle East and North Africa Regional
Office,
International Development Research
Centre,
8 Ahmed Nessim St, Giza, Cairo, Egypt.
accagjobbins@idrc.org.eg

GERMANY

Jürgen GRÄBENER
German technical Cooperation (GTZ),
Morocco
Martin.tampe@gtz.de

Christian HOPFNER
Fachgebiet Klimatologie Institut
für Ökologie Technische Universität Berlin
Christian.hoepfner@Klima.TU-Berlin.de

Arnim KUHN
Institute for Food and Resource Economics,
University of Bonn, Nussallee, Germany
arnim.kuhn@ilr.uni-bonn.de

Alexander REINHARD KASTL

German Technical Cooperation
Reinhard.Kastl@gtz.de

Dieter SCHERER
Institute of Ecology, Technische Universität
Berlin
dieter.scherer@tu-berlin.de

Oliver SCHULZ
Department of Geography, University of
Bonn;
IMPETUS project
oschulz@uni-bonn.de

Martin TAMPE
German technical Cooperation (GTZ),
Morocco Martin.Tampe@gtz.de

MOROCCO

Said ADIL
Haut Commissariat aux Eaux
et Forêts et à la Lutte Contre
la Désertification
0537 67 41 73
adil_said06@yahoo.fr

Abderrahmane AIT LHAJ
Institut Nationale de la Recherche
Agronomique, (INRA) Agadir, Maroc
aitlhaj_ab@yahoo.fr

Jamal AIT LHAJ
Directeur local du projet
IMPETUS, Ouarzazate Maroc
impetus.direction@menara.ma

Abdelaziz BABQIQI
Département de l'Environnement
0663506092
abdelaziz.babqiqi@gmail.com

Mohamed Boussaid
Protection de la nature
et lutte contre la désertification,
(PRONALCD)
Conseiller Technique
mohamed.boussaid@gtz.de
Tel: +212537674162
www.gtz.de/marokko

Khalid BRIBRI
Ministère de la Santé
*Direction de l'Epidémiologie
et de la Lutte Contre les Maladies*
0537 67 17 43
kbribri@sante.gov.ma

Ahmed CHEHBOUNI
Centre de Développement de la
Région de Tensift (CDRT), Marrakech,
Maroc
chehbouni@ucam.ac.ma

Abdelouahid CHRIYAA
Institut Nationale de Recherche

Agronomique, Settat, Maroc
chriyaaa@yahoo.fr

Fatima DRIOUCH
Direction de la Météorologie Nationale
Casablanca, Maroc
driouechfatima@yahoo.fr

Nahid ELBEZZAZ
Ministère de l'Agriculture,
du Développement Rural et des
Pêches Maritimes 0537 69 84 33
nahidelbezzaz@yahoo.fr

khadija ELHOUDI
Haut Commissariat au Plan
0537 76 42 25
gourmaweb@yahoo.fr

EI Houssine EL MZOURI
INRA Settat
elmzouri@yahoo.fr

Rachid FIRADI
Département de l'Environnement
0537 68 16 35
firadi@minenv.gov.ma

Ghita HAMZAoui
Coordinatrice Nationale du PMF-FEM
(Programme de Micro-Financements
du Fonds pour l'Environnement Mondial) -
Maroc
tel. + 212 5 37 66 14 36
email. fempmf_hamzaoui@menara.ma

Hassan HBID
Directeur du Centre Nationales des Etudes
et
Recherches sur le Sahara (CNERs)
UCAM, Marrakech
hbide@ucam.ac.ma

Adil HIDANE
Ministère des Finances et de la Privatisation
0537 67 74 29
hidane@depf.finances.gov.ma

Mohammed-Saïd KARROUK
Université Hassan II, Casablanca
karrouksaid@yahoo.com

Abdellatif Khattabi
Ecole Nationale Forestière d'Ingénieurs
de Salé, Maroc
abdellatif_khattabi@hotmail.com

Mahdi KHARROUJ
Ministère de l'Équipement et du Transport
Direction des Affaires Techniques
0537 76 59 85
mahdibelarbi@hotmail.com

Mohamed MAKTIT
Département de l'Environnement
0537570642
m.maktit@gmail.com

Mohamed NBOU
Département de l'Environnement
0537576641
nbou@environnement.gov.ma

Abdellah LAOUINA
CNST Rabat
0661 10 07 73
laouina@menara.ma

Ahmed NAJMI
Ministère de l'Énergie et des Mines
*Direction Contrôle et Prévention des
Risques*
0575 93 24 44

Anne-France WITTMANN
Chargée du programme
Adaptation à base communautaire
(Community-Based Adaptation) PNUD/FEM
Programme de Micro-Financements
du Fonds pour l'Environnement Mondial -
Maroc

tel. + 212 5 37 66 14 36
email. annefrance.wittmann@undp.org

Ahmed LEGROURI
School of Science & Engineering
Al Akhawayn University, Maroc
Legrouri@aui.ma

Mohammed LOUDIKI
Faculté des Sciences Semlalia
Département de Biologie, Marrakech, Maroc
loudiki@ucam.ac.ma

My Rchid MEKKAOUI ALAOU
Association pour la protection de
l'environnement et développement
durable à Errachidia, Maroc
myrchid_mekkaoui@yahoo.fr

Abdalah MOKSSIT
Division de la Météorologie Nationale
Casablanca, Maroc
mokssit.abdalah@yahoo.fr

Abdelkader MOKHLISSE
Centre de Développement de la Région
de Tensift (CDRT), Marrakech, Maroc
mokhlisse@gmail.com

Naïma OUMOUSA
Ministry of Energy, Mines, Water and
Environment , Rabat, Morocco
noumousa@yahoo.com

Mohammed YACOUBI-KHEBIZA
Faculté des Sciences Semlalia
Département de Biologie, Marrakech, Maroc
yacoubi@ucam.ac.ma

Abdelaziz YAHYAOU
Département de Géographie FLSH
Marrakech, Maroc
ayahyaoui2006@yahoo.fr

TUNISIA

Ali ABAAB
Expert GTZ
Coordinateur de la composante
vulnérabilité et adaptation (V&A)
Appui à la mise en œuvre CCNUCC
Adresse postale : B.P. 753, 1080 Tunis
Tel. Fixe : 00216 70 728 622
Tel. Portable : 00216 97 00 45 19
Email : abaabpan.gtz@gnet.tn

Moez BOURAOUI
Association Club UNESCO-ALECSO
pour le Savoir et le Développement Durable
CUA-SDD
17 Rue du Niger Belvedere 1002
Tunisia

Mohamed CHAHED
Agence Tunisienne de Coopération
Technique

Rue Slaheddine El Amami
Centre Urbain, Nord, Tunis B.P. 34,
Tunis Cedex 1080, Tunisie
Website <http://www.atct.nat.tn>

Afef JAAFAR
National Agency for
Energy Conservation
afef_jaafar@yahoo.fr

Yadh LABBENE
German technical
Cooperation (GTZ), Tunisia
labbene.gtz@gnet.tn

Samir OUERGUEMMI
Ministry of Public Health Tunisia
mazouzirim@yahoo.fr

USA

Dr. Lahouari BOUNOUA
NASA Goddard Space Flight Center (GSFC)
Biopsheric Sciences Branch Code 614.4
8700 Greenbelt Road, Maryland 20771
Telephone:301-614-6631
Fax:301-614-6695
Email: lahouari.Bounoua@nasa.gov

Eihab Fathelrahman (PhD)
B 308 William Clark Bldg.
Department of Agriculture and Resource
Economics
Colorado State University
Fort Collins, CO, 80525
Phone (970) 491-6949 (office) Phone (970)
412-6736 (Cell Phone)
Fax (970) 491-2067
Eihab.fathelrahman@colostate.edu

ANNEX 3: NORTH AFRICAN DESIGNATED CONTACT PERSONS TO THE UNFCCC

The North African Admitted NGO and Designated Contact Point to as observers to sessions of UNFCCC Conference of Parties (2009) includes:

Official Name	City	Country	Phone	Fax	Email
Association pour la protection de la nature et de l'environnement (APNEK) M. Chakib Zouaghi	Kairouan	Tunisia	(216-77) 22-9668	(216-77) 22-9668	apnektunisia@yahoo.fr
Association Tunisie Méditerranée pour le développement durable	Tunis	Tunisia	(216-1) 88-6591	(216-1) 88-6488	mistral@gnet.tn
Association tunisienne des changements climatiques et du développement durable (2C2D) M. Yadh Labane	Tunis	Tunisia	(216) 9740-9659		labbene@meteo.net.tn
Association écologique pour la protection de l'environnement de la faune et la flore de la Wilaya de Bechar (AEPEFF) M. Zoubir Benyoulef	Bechar	Algeria	(213-49) 83-0150	(213-49) 83-0150	aepeff@yahoo.fr
Association de recherche sur le climat et l'environnement (ARCE) Mr. Salah Sahabi Abed	Oran	Algeria	(213-772) 41-1375	(213-41) 53-8397	arce21@wissal.dz
Association des amis de la Saoura (AAS) M. Mohammed Bendada	Béchar	Algeria	(213-49)81- 1390/(213- 06)26-7216	(213-49) 81-7313	amisaoura@hotmail.com
Centre de développement de la région de Tensift* (CDRT) M. Mohammed Messouli	Marrakech	Morocco	(212-5) 2442-2842	(212-5) 2442-2843	messouli@ucam.ac.ma

Fondation Mohammed VI pour la protection de l'environnement* (FM6E) Mlle Nouzha Alaoui	Rabat	Morocco (212-37) 65-8844	(212-37) 65-5531	nealaoui@fm6e.or
Groupe de recherche pour l'environnement et le développement urbain et rural (GREDUR) Mr. Riad Baouab	Rabat-Agdal	Morocco (212-37) 77-4548/50	(212-37) 77-4540	rbaouab@yahoo.com