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.
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<th>Full Form</th>
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<tr>
<td>AfDB</td>
<td>African Development Bank</td>
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<tr>
<td>ACCESS</td>
<td>African Collaborative Centre for Earth System Science</td>
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<td>ADEME</td>
<td>Agence de l’Environnement et de la Maîtrise de l’Energie</td>
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<td>AfD</td>
<td>Agence Française de Développement</td>
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<td>AfricanNESS</td>
<td>African Network of Earth System Sciences</td>
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<td>AIACC</td>
<td>Assessments of Impacts and Adaptations to Climate Change</td>
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<td>AMASMer</td>
<td>Association Maghrébine des Sciences de la Mer</td>
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<td>AMCEN</td>
<td>African Ministerial Conference on the Environment</td>
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<td>ANER</td>
<td>l’Agence Nationale des Energies Renouvelables (Tunisia)</td>
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<td>ARCE</td>
<td>Observatoire des Changements Climatiques (Oran, Algérie)</td>
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<td>ASAL</td>
<td>Algerian space agency (Agence Spatiale Algérienne)</td>
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<td>BAD</td>
<td>Banque Africaine de Developement Organisation</td>
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<td>CCAA</td>
<td>Climate Change Adaptation in Africa</td>
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<td>CDER</td>
<td>Centre de Développement des Energies Renouvelables (Morocco)</td>
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<td>CDM</td>
<td>Clean Development Mechanism</td>
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<td>CDRT</td>
<td>Centre de Développement de la Région du Tensift</td>
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<td>CER</td>
<td>Carbon Emission Reduction</td>
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<td>CIDA</td>
<td>Canadian International Development Agency</td>
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<td>CLICOM</td>
<td>Climate Computing Project (World Climate Data Monitoring Programme)</td>
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<td>CLIPS</td>
<td>Climate Information and Prediction Services</td>
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<td>CLIVAR</td>
<td>Study on Climate Variability and Predictability (WCRP project)</td>
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<td>National remote sensing centre (Centre National de Télédétection – Tunisia)</td>
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<td>CNTS</td>
<td>Centre National des Techniques Spatiales Algeria</td>
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<td>COSMAR</td>
<td>Coastal and Marine Programme</td>
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<tr>
<td>CRTS</td>
<td>Royal centre for remote sensing (Centre Royal de Télédétection Spatiale)</td>
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<td>CSES</td>
<td>Center for Solar Energy Studies (Libya)</td>
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<td>CSP</td>
<td>Concentrating Solar thermal Power</td>
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<td>CTF</td>
<td>Clean Technology Fund</td>
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<td>Data Rescue</td>
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<td>DISTA</td>
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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 Disk 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
IFPR International Food Policy Institute
IGAD Inter-Governmental Authority on Development
IGBP International Geosphere- Biosphere Programme
IHDP International Human Dimensions Programme
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 WaterInstitute
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 Nation for 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 Experts\(^1\) 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

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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 its 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 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)\textsuperscript{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 continent\textsuperscript{3}. 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 12\textsuperscript{th} 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 Experts\textsuperscript{1} was adopted by the Ministerial Segment.


\textsuperscript{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](image)

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 (Annex 1) 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

<table>
<thead>
<tr>
<th>Activities description</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>Relevant information collected and collated.</td>
</tr>
<tr>
<td>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.</td>
<td>Relevant information validated.</td>
</tr>
<tr>
<td>Develop an enhanced conceptual outline to serve as the basis for identifying and filling gaps in a comprehensive framework of African climate change programmes.</td>
<td>Development of a conceptual outline of a comprehensive framework of African climate change programmes initiated.</td>
</tr>
<tr>
<td>Identify gaps and make indicative recommendations for filling such gaps.</td>
<td>Gap identification and indicative recommendations made.</td>
</tr>
<tr>
<td>Develop a conceptual comprehensive framework of African climate change programmes</td>
<td>Conceptual outline of a draft comprehensive framework of African climate change programmes developed.</td>
</tr>
</tbody>
</table>

### 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 finding 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 if 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 GDP\(^5\). 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

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\(^5\) 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 described. 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 be 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 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.

<table>
<thead>
<tr>
<th>North Africa</th>
<th>2000</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Million</td>
<td>141.9</td>
<td>167.3</td>
<td>192.8</td>
<td>214.5</td>
<td>231.9</td>
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<tr>
<td>Exploitable Water</td>
<td>Bm³/y</td>
<td>81.8</td>
<td>81.8</td>
<td>81.8</td>
<td>81.8</td>
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<tr>
<td>Sustainable Water Used</td>
<td>Bm³/y</td>
<td>72.8</td>
<td>77.5</td>
<td>83.5</td>
<td>90.5</td>
<td>98.7</td>
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<tr>
<td>Agricultural Demand</td>
<td>Bm³/y</td>
<td>80.4</td>
<td>92.1</td>
<td>103.0</td>
<td>111.4</td>
<td>117.6</td>
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<tr>
<td>Municipal Demand</td>
<td>Bm³/y</td>
<td>8.6</td>
<td>12.1</td>
<td>16.8</td>
<td>22.6</td>
<td>29.7</td>
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<td>Industrial Demand</td>
<td>Bm³/y</td>
<td>5.4</td>
<td>7.6</td>
<td>10.6</td>
<td>14.3</td>
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<tr>
<td>Total Demand North Africa</td>
<td>Bm³/y</td>
<td>94.4</td>
<td>111.9</td>
<td>130.3</td>
<td>148.3</td>
<td>166.1</td>
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<tr>
<td>per capita Consumption</td>
<td>m³/cap/y</td>
<td>666</td>
<td>669</td>
<td>676</td>
<td>691</td>
<td>716</td>
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<tr>
<td>Wastewater Re-used</td>
<td>Bm³/y</td>
<td>3.2</td>
<td>5.6</td>
<td>9.2</td>
<td>14.5</td>
<td>21.7</td>
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<td>CSP Desalination</td>
<td>Bm³/y</td>
<td>0.0</td>
<td>0.2</td>
<td>4.7</td>
<td>49.5</td>
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<td>Minimum CSP Capacity</td>
<td>GW</td>
<td>0.1</td>
<td>0.1</td>
<td>2.0</td>
<td>21.2</td>
<td>26.1</td>
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<td>Desalination by Fossil Fuel</td>
<td>Bm³/a</td>
<td>0.4</td>
<td>1.3</td>
<td>4.6</td>
<td>9.5</td>
<td>8.1</td>
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<td>Groundwater Over-Use</td>
<td>Bm³/y</td>
<td>21.2</td>
<td>33.2</td>
<td>38.3</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>Natural Water Used</td>
<td>Bm³/y</td>
<td>69.6</td>
<td>71.6</td>
<td>73.5</td>
<td>74.9</td>
<td>75.5</td>
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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 $ / barrel\(^7\), 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 Center\(^8\) 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;

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

\(^8\) [http://www.renewableenergyworld.com](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
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, GOFC/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 Masreq 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.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>CDM ICI (max. 100 points)</th>
<th>Regional classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South Africa</td>
<td>78.0</td>
<td>Good climate</td>
</tr>
<tr>
<td>2</td>
<td>Tunisia</td>
<td>77.5</td>
<td>Good climate</td>
</tr>
<tr>
<td>3</td>
<td>Morocco</td>
<td>74.5</td>
<td>Satisfactory climate</td>
</tr>
<tr>
<td>4</td>
<td>Egypt</td>
<td>69.2</td>
<td>Satisfactory climate</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>54</td>
<td>Somalia</td>
<td>3.9</td>
<td>Unsatisfactory climate</td>
</tr>
</tbody>
</table>

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 organizations 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. 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 socio-economic 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 practices, 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

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<tr>
<th>Adaptation</th>
<th>Mitigation</th>
<th>supporting and enabling measures</th>
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<tr>
<td>Situation analysis</td>
<td>The wind and solar power represent the greatest percentage of the energy produced in the sub-region. North Africa Region has very</td>
<td>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,</td>
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<td>there are a range of adaptation actions taking place in the North Africa across sectors and institutions</td>
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<td>Very few, if any of the</td>
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adaptation actions are solely due to climate change. Many drivers of adaptation are not climate related, even though climate is just one of the drivers. The majority of examples in the inventory were found in the public sector. In the land use sector, there are few examples of planned adaptation to climate change across North Africa. 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.

low levels of energy efficiency, and as a result, energy efficiency has become a high priority for most North African governments. The North is estimated to suffer the impacts of sea level rise and associated coastal erosion, for North African countries, avoiding deforestation is not currently included in the CDMs. Current carbon finance mechanisms are not delivering enough resources vulnerability assessments so as to identify ways to improve or change management practices accordingly.

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. 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. Adaptive capacity building is taking place largely at the national scale, e.g. in national government policies and programmes.

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<th>Adaptation</th>
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<td>Most of the examples of the programmes are on planned adaptation rather than unplanned. Unplanned adaptation often seems to be the result of a ‘side-benefit’ of an action or North African countries have opportunities to evaluate trade-offs to improve energy efficiency, reduce emissions and increase urban environmental health outcomes by</td>
<td>African Common Position on Climate Change: AMCEN Special Session attended by participants from UNECA, UNESCO, UNDP, WHO, WMO, UNFPA, UNEP, WFP and IOM.</td>
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<tr>
<td>Achievements, Lessons learnt and experiences</td>
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<td>ClimpDev-Africa : program to</td>
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Achievements, Lessons learnt and experiences

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<th>Adaptation</th>
<th>Mitigation</th>
<th>Supporting and enabling measures</th>
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<tr>
<td>A lack of critical mass in human resources capacity is evident throughout the region. Several themes under capacity gaps are: - improving policy and institutional environment - limitations of the skills base capacity at district and local level - lack of integrated planning and</td>
<td>The main challenges and specific objectives for North Africa governments to improve energy efficiency include: - Delivering electricity to isolated rural populations, based on village-scale mini-grids;</td>
<td>Maximizing national participation without overloading the institutions is a major implementation challenge in regions with limited capacity. 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</td>
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Decision taken for other reasons.

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.

Promoting energy sector reforms

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.

Land degradation is too large a problem for a single institution to address alone.

Improving ground and surface water demand management requires sector-wide reforms to overcome the current state of governance.

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.

Too many overlapping and scattered programs and missions with conflicting objectives.

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.

Mechanisms are not yet available to facilitate joint resource mobilization or joint budgetary contributions.

The main challenges and specific objectives for North Africa governments to improve energy efficiency include:

- Delivering electricity to isolated rural populations, based on village-scale mini-grids;
- Improving ground and surface water demand management requires sector-wide reforms to overcome the current state of governance.
- 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.

Adaptation Mitigation Supporting and enabling measures
The challenges and gaps

- Management capacity in civil society
- Capacity for monitoring and evaluation
- Lack of action on climate change
- Capacity to manage selected ecosystem services for poverty alleviation.

Identified barriers to adaptation include:

- 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

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.

Accelerating the integration of 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;
- Disseminating cooling systems for the food conservation, powered by renewable, in farms and fisheries; addressing, in the grid-connected urban and tourist areas.

Several types of research gaps were identified:

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.

If research is to be effective it needs to be translated into appropriate policy and management knowledge, which then needs to be communicated (in an appropriate form) to the relevant stakeholders so that the necessary actions can be taken. Key ingredients of a communication strategy include: A ‘political’ champion
- 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.
**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 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

- 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.
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**

<table>
<thead>
<tr>
<th>Organization</th>
<th>Type DRRM</th>
<th>Relevant focus</th>
<th>Strategies</th>
<th>Programme (Pr)/ Initiative (I)/ Projects (P)</th>
<th>Where in NORTHERN Africa</th>
<th>Website of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Facility for Disaster Reduction and Recovery GFDRR</td>
<td>preparedness</td>
<td>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.</td>
<td>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.</td>
<td>P</td>
<td>Egypt, Morocco and Tunisia,</td>
<td><a href="http://gfdrr.org">http://gfdrr.org</a></td>
</tr>
<tr>
<td>GFDRR Ministry of Agriculture and Rural Development</td>
<td>Disaster Recovery</td>
<td>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</td>
<td>Expected Outcomes A procedure is in place to assess the disaster risk implications of major infrastructure project proposals Result Indicators The systematic incorporation of risk reduction into the imp. of emer. preparedness, response and recovery programs Output Indicators Professional Training</td>
<td>P</td>
<td>Morocco</td>
<td><a href="http://esdsvr.worldbank.org/gfdrr/activity_detail.s.cfm?oid=1578&amp;rg=763&amp;PrintMode=ye">http://esdsvr.worldbank.org/gfdrr/activity_detail.s.cfm?oid=1578&amp;rg=763&amp;PrintMode=ye</a></td>
</tr>
<tr>
<td>UE OSS Algerian space agency</td>
<td>Early warning</td>
<td>Desertification monitoring pilot systems the Mediterranean South countries: Tunisia and Morocco. Study of the</td>
<td>• identify needs and select technical options; • elaborate and test vulnerability indicators on a regular basis;</td>
<td>P</td>
<td>Algeria Morocco Tunisia</td>
<td><a href="http://www.oss-online.org">http://www.oss-online.org</a></td>
</tr>
<tr>
<td>Entity</td>
<td>Preparedness</td>
<td>Description</td>
<td>Impact</td>
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<tr>
<td>ASAL Royal centre for remote sensing-CRTS Morocco National remote sensing centre CNT-Tunisia</td>
<td>extension to Algeria The project led to the setting-up of a cartographic server and the creation of various desertification-monitoring indicators</td>
<td>• share information; • integrate indicators into national evaluation-monitoring devices of environmental action programmes; • disseminate results</td>
<td></td>
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</tr>
<tr>
<td>GTZ with HCEFLCD Hight commissariat of water and forest and combating desertification</td>
<td>Sustainable use of NRM and ecosystem services Capacity development</td>
<td>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</td>
<td>P Morocco <a href="http://www.gtz.de">www.gtz.de</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministère de l’Aménagement du Territoire et Environnement German Federal Ministry for Economic Cooperation and Development (BMZ)</td>
<td>Preparedness</td>
<td>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.</td>
<td>Pr Algeria <a href="http://www.enviro-gestion.org">www.enviro-gestion.org</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Marrakesh Centre Développement Région Tensift (CDRT)</td>
<td>Preparedness</td>
<td>Development of strong ground- and remote sensing based data layers including climate data and socio-economic attributes to assess risk-levels of climate change</td>
<td>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</td>
<td>P Morocco <a href="http://www.ucamac.ma/ccam">www.ucamac.ma/ccam</a></td>
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</tr>
<tr>
<td>Department of Water</td>
<td>Early warning</td>
<td>National Plan for Protection against Floods: target of 20 protected sites by year / Development of flood warning and emergency plans</td>
<td>strengthen of the national plan against flooding: expand the warning system and contingency plan</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.mem.gov.ma">www.mem.gov.ma</a></td>
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</tbody>
</table>
| 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:  
• 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.marocmeteo.ma |
<p>| 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 |  | Morocco | <a href="http://www.water.gov.ma">www.water.gov.ma</a> |
| Department of the Environment | Water | Green taxation | Green taxation for saving water by individuals | Pr | Morocco | <a href="http://www.minenv.gov.ma">www.minenv.gov.ma</a> |
| Department of the Environment | Water | Recover rainwater | Deliverance of credits to purchase reservoirs to recover rainwater | Pr | Morocco | <a href="http://www.minenv.gov.ma">www.minenv.gov.ma</a> |</p>
<table>
<thead>
<tr>
<th>Department of Water</th>
<th>Agriculture</th>
<th>generalization of drip</th>
<th>Conversion to drip irrigation</th>
<th>Pr</th>
<th>Morocco</th>
<th><a href="http://www.water.gov.ma">www.water.gov.ma</a></th>
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<tbody>
<tr>
<td>Department of Water</td>
<td>Agriculture</td>
<td>rehabilitation of irrigation systems</td>
<td>Improvement of yields of water supply networks to irrigated area</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
</tr>
<tr>
<td>Department of Water</td>
<td>Agriculture and water</td>
<td>promotion of participatory irrigation management</td>
<td>Implication of local associations and regional services</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water and Ministry of Agriculture</td>
<td>Agriculture and water</td>
<td>Adoption of modern irrigation</td>
<td>financial support for adoption of modern irrigation</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a> <a href="http://www.madrpm.gov.ma">www.madrpm.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>Water</td>
<td>planning of dams and drainage channels</td>
<td>Realization of 59 large dams between 2008 and 2030 and Continuation of the program of small and medium dams</td>
<td>P</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>Water</td>
<td>Limitation of pumping in groundwater /Programs of artificial recharge of groundwater</td>
<td>Strategy of protection of groundwater resources</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<td>Department of Water</td>
<td>Water</td>
<td>Water resources</td>
<td>Backup program of water sources</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<td>HCEFLCD</td>
<td>Forests</td>
<td>Oases</td>
<td>Program of preservation of the oases</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.eauxetforets.gov.ma">www.eauxetforets.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>Water</td>
<td>Collecting rainwater</td>
<td>Program of collecting rainwater</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Ministry of Agriculture</td>
<td>Agriculture</td>
<td>Technical measures - Changes in agricultural practices</td>
<td>use of selected seeds and choice of varieties adapted to climate</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.madrpm.gov.ma">www.madrpm.gov.ma</a></td>
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<tr>
<td>Ministry of Agriculture and Department of water</td>
<td>Water and Forests</td>
<td>Soil erosion</td>
<td>protection against soil erosion, pollution and desertification / soil protection by vegetation: olive and fruit trees</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a> <a href="http://www.madrpm.gov.ma">www.madrpm.gov.ma</a></td>
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<td>Ministry of Agriculture</td>
<td>Water and agriculture</td>
<td>new species resistant to water stress</td>
<td>Introduction of Program of new species resistant to water stress</td>
<td>P</td>
<td>Morocco</td>
<td><a href="http://www.eauxetforets.gov.ma">www.eauxetforets.gov.ma</a></td>
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<tr>
<td>HCEFLCD</td>
<td>Forests</td>
<td>Reforestation</td>
<td>reforestation strategy</td>
<td>Pr</td>
<td>Morocco</td>
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<tr>
<td>HCEFLCD</td>
<td>Coastal zones</td>
<td>Distribution and abundance of</td>
<td>Impact assessment of climate</td>
<td>P</td>
<td>Morocco</td>
<td><a href="http://www.eauxetforets.gov.ma">www.eauxetforets.gov.ma</a></td>
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<tr>
<td>Ministry of Tourism</td>
<td>Coastal zones and Forests</td>
<td>Tourism activities</td>
<td>Program of restrictions on tourism activities can affect ecosystems</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.tourisme.gov.ma">www.tourisme.gov.ma</a></td>
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<tr>
<td>Department of the Environment</td>
<td>Forests</td>
<td>Desertification</td>
<td>Assessment of the strategy against desertification in relation with climate change</td>
<td>P</td>
<td>Morocco</td>
<td><a href="http://www.minenv.gov.ma">www.minenv.gov.ma</a></td>
</tr>
<tr>
<td>National Committee for Crisis Management and Disaster Risk Reduction (NCCMDRR)</td>
<td>Preparedness</td>
<td>The NCCMDRR, a multi sectoral platform for disaster risk reduction and crisis management is functioning as the “National Platform”. It has several</td>
<td>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.</td>
<td>P</td>
<td>Egypt</td>
<td></td>
</tr>
<tr>
<td>CMDRS/IDSC</td>
<td>preparedness</td>
<td>Risk assessment was developed for several disasters, (earthquakes and flash floods for example).</td>
<td>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.</td>
<td>P</td>
<td>Egypt</td>
<td></td>
</tr>
<tr>
<td>CMDRS/IDSC</td>
<td>Early warning</td>
<td>Early warning systems linked to some major hazards (earthquakes, flash floods and air quality) are in place, with indirect outreach to communities.</td>
<td>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.</td>
<td>P</td>
<td>Egypt</td>
<td></td>
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<tr>
<td>Department of Water</td>
<td>preparedness</td>
<td>National Plan for Protection against Floods: target of 20 protected sites by year / Development of flood warning and emergency plans</td>
<td>strengthen of the national plan against flooding: expand the warning system and contingency plan</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>emergency response</td>
<td>Financial support</td>
<td>Development of the financial mechanisms as insurance and disaster funds.</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<td>Department of Water</td>
<td>preparedness</td>
<td>Drought management</td>
<td>Plan of drought management and emergency</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>HCEFLCD</td>
<td>emergency response</td>
<td>Fires warning</td>
<td>Reinforcement of the plan of fires warning</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.eauxetforets.gov.ma">www.eauxetforets.gov.ma</a></td>
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<tr>
<td>Direction of the National Meteorology</td>
<td>preparedness</td>
<td>Reinforcement of Research on Climate Change</td>
<td>Reinforcement of Climate change Research over Morocco and quantifying vulnerabilities</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.marocmeteo.ma">www.marocmeteo.ma</a></td>
</tr>
<tr>
<td>Ministry of health</td>
<td>preparedness</td>
<td>Health alert plans</td>
<td>Reinforcement of health alert plans</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.sante.gov.ma">www.sante.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>emergency response</td>
<td>Misuse of water</td>
<td>fight against the misuse of water</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>emergency response</td>
<td>Improvement of network performance of water</td>
<td>fight against the loss of water infrastructures</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>preparedness</td>
<td>feeding hydrants</td>
<td>Rationalization of feeding hydrants in rural areas</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>Emergency response</td>
<td>Saving of Industrial Water : plan of water conservation, water recycling, unconventional water.</td>
<td>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</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>Emergency response</td>
<td>Erosion</td>
<td>Protection of catchment basin upstream dams against erosion</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of Water</td>
<td>Emergency response</td>
<td>Exploitation of groundwater</td>
<td>Reinforcement of the system of control and penalties for over-exploitation of groundwater</td>
<td>I</td>
<td>Morocco</td>
<td><a href="http://www.water.gov.ma">www.water.gov.ma</a></td>
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<tr>
<td>Department of the Environment</td>
<td>Preparedness</td>
<td>Research on the evolution of coast</td>
<td>development of scientific research on the evolution of coast</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.minenv.gov.ma">www.minenv.gov.ma</a></td>
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<tr>
<td>Ministry of health</td>
<td>Early warning</td>
<td>Extreme weather events</td>
<td>Alert plans to extreme weather events to prevent their effects on the population</td>
<td>Pr</td>
<td>Morocco</td>
<td><a href="http://www.sante.gov.ma">www.sante.gov.ma</a></td>
</tr>
<tr>
<td>ABHT Tensift Basin Agency, Marrakech, Japanese Cooperation (JICA)</td>
<td>Early warning</td>
<td>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</td>
<td>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.</td>
<td>P/I</td>
<td>Morocco</td>
<td><a href="http://www.eau-tensift.net/site-web.html">http://www.eau-tensift.net/site-web.html</a></td>
</tr>
</tbody>
</table>

**Adaptation – B**

**Sectoral planning and implementation (SPI): adaptation in key sectors – water; agriculture; health; energy; forests; coastal zones; infrastructure; urban management and tourism**
<table>
<thead>
<tr>
<th>Organization</th>
<th>Type SPI</th>
<th>Relevant focus</th>
<th>Strategies</th>
<th>Programme (P)/ Initiative (I)/ Projects (P)</th>
<th>Where in Northern Africa</th>
<th>Website of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNDP / GEF-SGP</td>
<td>Community Based Adaptation (CBA) Programme</td>
<td>Cross-sectoral (water, agriculture, forests, coastal zones)</td>
<td>Small-scale projects are implemented to increase community/ecosystem resilience to climate change</td>
<td>Programme Objective in Morocco: 12 CBA projects by 2011.</td>
<td>Morocco</td>
<td><a href="http://www.undp-adaptation.org/project/cba">www.undp-adaptation.org/project/cba</a></td>
</tr>
<tr>
<td>Espace Rural Tarmguiste (Partners: CBA – SGP; POS)</td>
<td>Water and agriculture</td>
<td>Increase the resilience of the Tarmguiste Oasis ecosystem to the impacts of climate change</td>
<td>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.</td>
<td>Project (in preparation)</td>
<td>Morocco</td>
<td></td>
</tr>
<tr>
<td>Association Tiflit Iguiwaz (Partners: CBA-SGP; POS)</td>
<td>Water and agriculture</td>
<td>Increase the resilience of the Iguiwaz Oasis ecosystem to the impacts of climate change</td>
<td>Improve water management and irrigation systems; Experiment with resilient agricultural and forestry species; Experiment with a special revolving fund for adaptation;</td>
<td>P (in preparation)</td>
<td>Morocco</td>
<td></td>
</tr>
<tr>
<td>IFAD GEF Agency; World Bank</td>
<td>Costal International</td>
<td>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).</td>
<td>The project is relevant and allowed to strengthen the initiatives supported by France to promote an Integrated Coastal Zone Management around Mediterranean Sea.</td>
<td>Algeria, Egypt, Libya, Morocco, Tunisia</td>
<td><a href="http://operations.ifad.org/web/ifad/">http://operations.ifad.org/web/ifad/</a></td>
<td></td>
</tr>
<tr>
<td>IFAD GEF Agency; World Bank</td>
<td>Costal Regional</td>
<td>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.</td>
<td>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.</td>
<td>Algeria, Egypt, Libya, Morocco, Tunisia</td>
<td><a href="http://operations.ifad.org/web/ifad/">http://operations.ifad.org/web/ifad/</a></td>
<td></td>
</tr>
<tr>
<td>In cooperation with GTZ (2009)</td>
<td>Tourism</td>
<td>Climate Change Adaptation and Mitigation in the Tourism Sector in Tunisia</td>
<td>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.</td>
<td>Tunisia</td>
<td><a href="http://gtz.de/en/weltweit/maghreb-naher-osten/1642.htm">http://gtz.de/en/weltweit/maghreb-naher-osten/1642.htm</a></td>
<td></td>
</tr>
<tr>
<td>Alexandria Governorate</td>
<td>Urbain Management</td>
<td>The Egypt Alexandria Development Project objective is to support local support to basic infrastructure, community facilities and services, including the construction of water,</td>
<td></td>
<td>Egypt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 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


PNUD (2008) | Costal 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 |
<table>
<thead>
<tr>
<th>Facility (GEF)</th>
<th>Costal zones</th>
<th>Regional: Technical Support, Planning and Capacity for Waste Water Treatment and Recycling Technology</th>
<th>Regional initiatives designed: to support national agendas to address shared challenges affecting the Mediterranean Sea to explore the economies of scale of regional cooperation:</th>
<th>P</th>
<th>Morocco Tunisia Egypt</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUSTAINABLE MED Program Framework Global Environment Facility (GEF)</td>
<td>Energy</td>
<td>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.</td>
<td>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</td>
<td>P</td>
<td>Tunisia</td>
</tr>
<tr>
<td>Agence Nationale des Energies Renouvelables (ANER) Natural Resources Canada</td>
<td>Energy</td>
<td>Cogeneration feasibility Studies set up of a short and medium term action plan for cogeneration development.</td>
<td>Analyzing the company energy consumption profile. Proposing an adequate cogeneration system. Evaluating investment and operation costs.</td>
<td>P</td>
<td>Tunisia</td>
</tr>
<tr>
<td>ENERPLUS with the support of UNDP</td>
<td>Urban Agriculture</td>
<td>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.</td>
<td>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.</td>
<td>P</td>
<td>Morocco <a href="http://www.uac-m.org">http://www.uac-m.org</a></td>
</tr>
<tr>
<td>Technische Universität Berlin, Authorities of Land-Use Planning, Water and Environment in Casablanca</td>
<td>Water, agriculture</td>
<td>This project will examine</td>
<td>The project will work with multiple</td>
<td>P</td>
<td>Morocco</td>
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</tbody>
</table>
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.

**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.

**SUSTAINABLE MED**  
**Water**  
**Water Reuse, Optimization**  
Accentuated pressures on natural...
<table>
<thead>
<tr>
<th>Program Framework and Implementation Program</th>
<th>German Federal Ministry for Economic Cooperation and Development (BMZ) Ministry of Water Resources and Irrigation (MWRI)</th>
<th>Water</th>
<th>Management training in Egypt’s water sector / Promotion of the National Training Centre at the Ministry of Water Resources and Irrigation</th>
<th>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.</th>
<th>P</th>
<th>Egypt</th>
<th>Website of the Egyptian Ministry of Water Resources and Irrigation <a href="http://www.mwri.gov.eg">www.mwri.gov.eg</a> Regional Centre for Training and Water Studies (RCTWS) <a href="http://www.rctws.com">www.rctws.com</a></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>German Federal Ministry for Economic Cooperation and Development (BMZ) Holding Company for Water and Wastewater (HCWW), Ministry of Housing, Urbanisation and Urban Development (MoHUUD)</td>
<td>Water Supply and Wastewater Management</td>
<td>Water supply and wastewater disposal services are improved in selected Egyptian governorates.</td>
<td>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.</td>
<td>P</td>
<td>Egypt</td>
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<tr>
<td></td>
<td>Global Environment Facility Ministry of Agriculture and Water Resources</td>
<td>Agriculture and Water</td>
<td>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.</td>
<td>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</td>
<td>P</td>
<td>Tunisia</td>
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<tr>
<td>Initiative</td>
<td>Sector</td>
<td>Activity</td>
<td>Description</td>
<td>Country</td>
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<tr>
<td>Sustainable Cities Initiative (SCI) Algiers' Wilaya</td>
<td>Urban management</td>
<td>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</td>
<td>Installation of a preventive maintenance system for the reduction of maintenance costs through a better rotation of equipment and availability of the maintenance staff</td>
<td>Algeria</td>
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<tr>
<td>Industry Canada SCI</td>
<td>Water</td>
<td>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</td>
<td>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.</td>
<td>Algeria</td>
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<tr>
<td>UNDP</td>
<td>Water</td>
<td>Mapping of Natural Resources for Agricultural Use and Planning</td>
<td>Establishment of a GIS supported database of natural resources</td>
<td>Libya</td>
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<tr>
<td>Libya Government</td>
<td>Water</td>
<td>Wadi Gattara Dam Rehabilitation</td>
<td>Water storage for irrigation purposes</td>
<td>Libya</td>
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<td>Wadi Al-Wishka Dam</td>
<td>Water Storage for flood protection and groundwater recharge</td>
<td>Libya</td>
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<td></td>
<td></td>
<td>Dam Site Studies</td>
<td>Final studies and detailed design of dams in northern Libya</td>
<td>Libya</td>
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<td></td>
<td></td>
<td>Drilling of Exploratory Wells</td>
<td>Hydrogeological investigations and monitoring networks</td>
<td>Libya</td>
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<td></td>
<td>Soil and Water Studies of SW region</td>
<td>Soil mapping, hydrogeological and geological investigations</td>
<td>Libya</td>
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<td>Hydrogeological Investigations of Sarir Tibesti</td>
<td>Reconnaissance drilling and hydrogeological studies</td>
<td>Libya</td>
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<td></td>
<td>Groundwater Vulnerability Studies</td>
<td>Assessment and mapping of aquifers to determine vulnerability to pollution</td>
<td>Libya</td>
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<td>Wadi Talal Flood Management</td>
<td>Flood control of Sirte city</td>
<td>Libya</td>
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<td>Wadi Abu-Shayba &amp; Al-Rumman Dams</td>
<td>Water storage for irrigation and flood protection purposes</td>
<td>Libya</td>
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<tr>
<td>Project Name</td>
<td>Description</td>
<td>Organization</td>
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<td>Wadi Ahmar Dam</td>
<td>Water storage for irrigation and flood protection purposes</td>
<td>P Libya</td>
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<tr>
<td>Wadi Derna Dams Rehabilitation</td>
<td>Water storage for irrigation, water supply and flood protection purposes</td>
<td>P Libya</td>
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</tr>
<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>Soil and Water Studies of SE Region Libya, Karst Spring Studies in Eastern Region (Ayn Zayana), Study of the Coastal Undersea Karst Springs, Study of Evapotranspiration in the Coastal Sabkhas and Dam Reservoirs, Electronic Archiving and Construction of Water Resources Data Bases Study and Inventory of Irrigated Areas, Phase I, Evaluation of Irrigation Systems</td>
<td>P Libya</td>
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<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>Soil mapping, hydrogeological and geological investigations, Study of the flow regime of the karst system in the eastern zone, Determination of the occurrence of under-sea fresh water springs, Quantification of evapotranspiration</td>
<td>P Libya</td>
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<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>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.</td>
<td>P Libya</td>
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<td>Libya Libya</td>
<td>Water</td>
<td>Evaluation of the performance of the different irrigation techniques applied in Libya</td>
<td>p Libya</td>
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<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>Use of GIS in the fields of irrigation and drainage.</td>
<td>p Libya</td>
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<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>Renovating the irrigation equipments, network, water storage at Benghazi area</td>
<td>p Libya</td>
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<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>Land reclamation and installation of irrigation systems, wells, reservoirs…</td>
<td>P Libya</td>
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<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>Water resources assessment, modeling, data base, consultation mechanism</td>
<td>P Libya</td>
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<tr>
<td>Libya Libya</td>
<td>Water</td>
<td>Use of remote sensing images to define areas under irrigation</td>
<td>P Libya</td>
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<tr>
<td>Libya FAONEPAD,</td>
<td>Food security</td>
<td>Food Security Scheme</td>
<td>Objective: to improve national food</td>
<td>P Libya</td>
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</tbody>
</table>

63
<p>| <strong>Government, Private Sector</strong> | <strong>(Wheat, Dates &amp; Olives, Seed Production)</strong> | <strong>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.</strong> |
| <strong>Libya government</strong> | <strong>water</strong> | <strong>Wadi Derna Water Collection Project</strong> | <strong>Water collection and storage for water supply purposes</strong> | <strong>P</strong> | <strong>Libya</strong> |
|  |  | <strong>Wadi AL-Khalij &amp; AL-Muallaq Dams</strong> | <strong>Water storage for irrigation and flood protection purposes</strong> | <strong>P</strong> | <strong>Libya</strong> |
|  |  | <strong>Wadi Zaghadnah and Shuhbayyin Dams</strong> | <strong>Water storage for irrigation and flood protection purposes</strong> | <strong>P</strong> | <strong>Libya</strong> |
|  |  | <strong>Wadi Turghat, Qirim and Ghanima Dams</strong> | <strong>Water storage for irrigation purposes</strong> | <strong>P</strong> | <strong>Libya</strong> |
|  | <strong>UN</strong> | <strong>Water Shared Aquifers</strong> | <strong>Operation of the Regional Centre for Management of Shared Aquifers in Africa (UNESCO Category 2 Centre)</strong> | <strong>P</strong> | <strong>Libya</strong> |
|  | <strong>Costal</strong> | <strong>Sea-Water Intrusion Studies</strong> | <strong>Assessment of current situation of seawater intrusion along the Libyan coast</strong> | <strong>P</strong> | <strong>Libya</strong> |
|  | <strong>Water</strong> | <strong>Water Resources Strategy</strong> | <strong>Updating Libyan Water Strategy (2000-2025) to cover the period (2010-2030)</strong> | <strong>P</strong> | <strong>Libya</strong> |
| <strong>Proposed : Government, private sector, foreign investors</strong> | <strong>Agriculture</strong> | <strong>Wheat production scheme</strong> | <strong>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 rehabilitation of existing projects, new expansions in existing projects and expansions in new areas.</strong> | <strong>P</strong> | <strong>Libya</strong> |
|  | <strong>Agriculture</strong> | <strong>Olive production project</strong> | <strong>Expansion in olive trees planting to meet the national demand for olive</strong> | <strong>P</strong> | <strong>Libya</strong> |</p>
<table>
<thead>
<tr>
<th>Sector, investors</th>
<th>Sector, investors</th>
<th>Sector, investors</th>
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<tbody>
<tr>
<td>private, foreign investors</td>
<td>private, foreign investors</td>
<td>private, foreign investors</td>
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<tr>
<td>proposed: Government, private sector, foreign investors</td>
<td>Agriculture</td>
<td>Date palm production project</td>
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<tr>
<td></td>
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<td>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.</td>
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<td></td>
<td>Water</td>
<td>Great Man Made River (GMMR)</td>
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<td>The project aims at creating a huge network that will supply a total of 6.0mm3/ 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.</td>
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<tr>
<th>Sector, investors</th>
<th>Sector, investors</th>
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<tbody>
<tr>
<td>START</td>
<td>urban</td>
<td>Impact of Urban Growth on Surface Climate: A Case Study in Oran, Algeria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remote sensing for large/local scale LULCC - How human activity affect the climate</td>
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<td><a href="http://start.org">http://start.org</a></td>
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<tr>
<th>Sector, investors</th>
<th>Sector, investors</th>
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<tbody>
<tr>
<td>TIGER ESA Centre National des Techniques Spatiales</td>
<td>Costal zones</td>
<td>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</td>
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<tr>
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<td>relationship between spectral data and in situ data; The interactivity between these various data will allow an optimal exploitation of the areas polluted.</td>
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<td><a href="http://start.org">http://start.org</a></td>
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<th>Sector, investors</th>
<th>Sector, investors</th>
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<tr>
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<td>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</td>
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<td>Activity</td>
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<td>Télédétection et Information Spatiale pour la Gestion intégrée des Ressources en Eau dans le bassin hydraulique de Souss-Massa (Agadir, Maroc)</td>
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<td>TIGER ESA CRTS Agence du Bassin Hydraulique de Souss-Massa (ABHSM) Maroc Université Inb Zohr, Agadir Maroc</td>
<td>WATER</td>
<td>Risk Assessment of extreme climate events on Alexandria City</td>
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<td>TIGER ESA Initiative Arab Academy of Science and Technology</td>
<td>Hazards</td>
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<td>Hazards Land Environment</td>
<td>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)</td>
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<td>Land Environment Hazards</td>
<td>.Étude des variations du relief sur le territoire Tunisien par interférométrie</td>
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**Adaptation – C**

**Building economic and social resilience (BES)**
<table>
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<tr>
<th>Organization</th>
<th>Type</th>
<th>Relevant focus</th>
<th>Strategies</th>
<th>Programme (Pr)/ Initiative (I)/ Projects (P)</th>
<th>Where in NORTHERN Africa</th>
<th>Website of Organization</th>
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<td><strong>Adaptation – C. Building economic and social resilience (BES)</strong></td>
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<td>UNDP / GEF-SGP</td>
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<tr>
<td>Community Based Adaptation (CBA) Programme</td>
<td>Building local communities` social/economic resilience</td>
<td>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...)</td>
<td>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.</td>
<td>Programme Objective in Morocco : 12 CBA projects by 2011.</td>
<td>Morocco</td>
<td><a href="http://www.undp-adaptation.org/project/cba">www.undp-adaptation.org/project/cba</a></td>
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<tr>
<td>Ministry of Agriculture, Rural Development and Fisheries United Nations Office for Project Services (UNOPS)</td>
<td>Building local communities` social/economic resilience</td>
<td>Rural Development Project in the Mountain Zones of Errachidia Province</td>
<td>The project’s overall goal is to improve the living conditions and incomes of poor households in the mountain zones of Errachidia province,</td>
<td>P</td>
<td>Morocco</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview</a></td>
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<td>Rural Development Project in the Eastern Middle Atlas Mountains</td>
<td>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,</td>
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<td>Livestock and Rangelands Development Project in the Eastern Region – Phases I &amp;II</td>
<td>The main objective is to increase incomes and improve living conditions among rural poor people in the eastern region</td>
<td>P</td>
<td>Morocco</td>
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<tr>
<td></td>
<td></td>
<td>Rural Development Project in the Mountain Zones of Al</td>
<td>The project’s overall objective is to contribute to the social and economic</td>
<td>P</td>
<td>Morocco</td>
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<tr>
<td>IFAD</td>
<td>Building local communities’ social/economic resilience</td>
<td>Rural Development Project for the Mountain Zones in the North of the Wilaya of M’Sila women.</td>
<td>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</td>
<td>P</td>
<td>Algeria</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/1257/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/1257/project%20overview</a></td>
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<tr>
<td>IFAD</td>
<td>Building local communities’ social/economic resilience</td>
<td>Pilot Project for the Development of Mountain Agriculture in the Watershed Basin of Oued Saf Saf</td>
<td>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.</td>
<td>P</td>
<td>Algeria</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/1257/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/1257/project%20overview</a></td>
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<tr>
<td>IFAD</td>
<td>Building local communities’ social/economic resilience</td>
<td>Artisanal Fisheries Pilot Development Project</td>
<td>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.</td>
<td>P</td>
<td>Algeria</td>
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<tr>
<td>IFAD</td>
<td>Building local communities’ social/economic resilience</td>
<td>Rural Development Project for Touarirt-Taforalt holds back agricultural development.</td>
<td>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</td>
<td>P</td>
<td>Morocco</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview</a></td>
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<td>Country Project Summary Link</td>
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<tr>
<td>IFAD</td>
<td>Pilot Project for Integrated Rural Development of the Mélégue Watershed</td>
<td>The project broke new ground by promoting cooperative development and by adopting a group approach to lending, repayment and environmental conservation activities.</td>
<td>Algeria and Tunisia</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview</a></td>
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<tr>
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<tr>
<td>Arab Fund for Economic and Social Development (AFESD)</td>
<td>Cereal and Livestock Smallholder Development Project in the Wilaya of Tiaret</td>
<td>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</td>
<td>Algeria</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview</a></td>
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<td>GEF</td>
<td>MENARID - A Circular Economy Approach to Agro-Biodiversity Conservation in the Souss Massa Draa Region of Morocco</td>
<td>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” These initiatives should have to work closely in order to propose and to implement common strategies of valorisation and marketing</td>
<td>Morocco</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/morocco/1388/project%20overview</a></td>
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<td>Protection and valorisation of South Moroccan Oasis</td>
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<td>IFAD</td>
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<td>MENARID Conservation of Globally Significant Biodiversity and Sustainable Use of Ecosystem Services in Algeria’s Cultural Parks</td>
<td>Algeria</td>
<td><a href="http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview">http://operations.ifad.org/web/ifad/operations/country/project/tags/algeria/226/project%20overview</a></td>
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<td>GEF Agency: UNDP</td>
<td>Social/economic</td>
<td>MENARID Conservation of Globally Significant Biodiversity and Sustainable Use of Ecosystem Services in Algeria’s Cultural Parks</td>
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<td>Approach</td>
<td>Challenges</td>
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<td>(200 km south of Algiers) will have 400 000 inhabitants. The project is facing</td>
<td>This approach implies a clean energy framework, the development of</td>
<td>regard to the scarcity of sustainable development challenges with</td>
<td>ria/226/project%20overview</td>
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<td>sustainable development challenges with regard to the scarcity of natural</td>
<td>energy efficiency buildings, drawings of master plans for transport, waste</td>
<td>regard to the scarcity of natural resources of new cities with the use</td>
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<td>resources of new cities with the use of new concepts.</td>
<td>and public lightening.</td>
<td>of new cities with the use of new concepts.</td>
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<tr>
<td>The GoA is seeking technical assistance from UNEP/DTIE.</td>
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<td>Integrated and Sustainable POPs Management Project</td>
<td>Program on Obsolete pesticide.</td>
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<td>The project proposes to assist Egypt to manage its PCB, Dixons and Furans (POP</td>
<td>The project should consider in particular developing a prevention</td>
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<td>produced by combustion of wastes) and obsolete stockpiles.</td>
<td>component to avoid the generation of new stock of pesticides building on</td>
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<td>The GoA is seeking technical assistance from UNEP/DTIE.</td>
<td>the on-going work down in Tunisia.</td>
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<td>INRA Institut national de la recherche agronomique</td>
<td>The project examines the socioeconomic effects and potential technical</td>
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<td><a href="http://www.inra.org.ma">http://www.inra.org.ma</a></td>
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<td>Building local communities’ social/economic resilience</td>
<td>shortcomings of the dam.</td>
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<td>Integrated Eco systemic approach for optimization of small dams in Morocco:</td>
<td>The study was carried out in partnership with communities, elected</td>
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<td>Scenarios Analysis to improve the coping capacities of communities and the</td>
<td>officials, local administrators and development practitioners.</td>
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<td>resilience of ecosystems to climate changes</td>
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<td>Department of the Environment</td>
<td>Communication of scientific information on vulnerabilities to local</td>
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<td><a href="http://www.minenv.gov.ma">www.minenv.gov.ma</a></td>
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<td>Building local communities’ social/economic resilience</td>
<td>and regional collectivities to enable them to develop local plans for</td>
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<td>Integration of climate change adaptation in the NDH</td>
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<td>Department of Water and Ministry of Agriculture</td>
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<td>Water conservation in the installation of dams</td>
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<td>North-South transfer to support the socioeconomic development of</td>
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**Notes:**
- **P** stands for Partnership.
- **I** stands for Initiative.
- **Pr** stands for Program.
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<th>Department of Water and Direction of the National Meteorology</th>
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<td>Artificial insemination of clouds</td>
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<td>Generalization of optimal techniques of irrigation</td>
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<td>Act to clarify the responsibilities of different authorities involved in coastal</td>
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<td>Building local communities’ social/economic resilience</td>
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<td>Training and awareness on health</td>
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<td>Training and awareness on the adverse effects of climate change on health</td>
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<td>Capacity building for prevention and response to epidemic diseases</td>
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<td>Morocco</td>
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<td>Training of health personnel in quantity and quality</td>
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<td>Building local communities’ social/economic resilience</td>
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<tr>
<td>Integrated Agricultural Development Project in the Governorate of Siliana - Phase II</td>
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<tr>
<td>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</td>
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<td>P Tunisia</td>
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<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Sidi M'Hadheb Agricultural and Fisheries Development Project</td>
</tr>
<tr>
<td>Sidi Bouzid Rainfed Agriculture Development Project</td>
</tr>
<tr>
<td>Sidi Bouzid Irrigation Project</td>
</tr>
<tr>
<td>Building local communities’ social/economic resilience</td>
</tr>
<tr>
<td>Development Project of Small and Medium-Size Farms in the Governorates of Kef and Siliana</td>
</tr>
<tr>
<td>Integrated Agricultural Development Project in the Governorate of Kairouan</td>
</tr>
<tr>
<td>IFAD Building local communities’ social/economic resilience</td>
</tr>
<tr>
<td>West Beheira Settlement Project</td>
</tr>
<tr>
<td>IFAD Building local communities’ social/economic resilience</td>
</tr>
<tr>
<td>Minya Agricultural Development Project</td>
</tr>
<tr>
<td>Fayoum Agricultural Development Project</td>
</tr>
<tr>
<td>Through extension advice, training and credit, the cropping pattern also shifted towards high-value crops. Field crops decreased from 69 to 48</td>
</tr>
</tbody>
</table>
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 | 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: IFADpartners

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 Nubaria 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. Project initiatives include: 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 |
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.

---

### Mitigation – D

**Energy Sector**

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

<table>
<thead>
<tr>
<th>Organization</th>
<th>Type Energy Sector</th>
<th>Relevant focus</th>
<th>Strategies</th>
<th>Programme (Pr)/ Initiative (I)/ Projects (P)</th>
<th>Where in NORTHERN Africa</th>
<th>Website of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans-Mediterranean Renewable Energy Cooperation</td>
<td>Renewable Energy</td>
<td>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</td>
<td>Provide Europe with one sixth of its electricity. It could take 30 years to build, with a cost of more than £200 billion. The high solar radiation in the deserts of the Middle East and North Africa outweighs the 10–15%</td>
<td>I/P</td>
<td>North Africa</td>
<td><a href="http://www.nokrashy.net/">http://www.nokrashy.net/</a></td>
</tr>
</tbody>
</table>

---

### 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

<table>
<thead>
<tr>
<th>Concentrating Solar Power for Seawater Desalination</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>P</td>
</tr>
</tbody>
</table>

### UE
NERA – Egypt 
New and Renewable Energy Development and Utilization Authority 
ONEP Morocco Office National de l’Eau Potable PEC

<table>
<thead>
<tr>
<th>Solar Power And Desalination Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>MED-CSD: Combined Solar Power and Desalination Plants: Techno-Economic Potential in Mediterranean Partner Countries</td>
</tr>
<tr>
<td>The MED-CSD project is a project funded by the European Commission – DG Research under the 7th Framework Programme (FP7).</td>
</tr>
</tbody>
</table>
| 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 techno-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

<table>
<thead>
<tr>
<th>MED-CSP</th>
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</thead>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Subject Area</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>German Aerospace Center (DLR, Germany) National Energy Research Center (NERC, Jordan) A. Bennoua (NE, Germany) (NREA, Egypt) (NEAL, Algeria) (IFEED, Germany) Hamburg Institute</td>
<td>Energy</td>
</tr>
<tr>
<td>German Development Cooperation</td>
<td>Energy</td>
</tr>
<tr>
<td>Activity Description</td>
<td>Utility</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Tunisian gas and electricity utility, STEG, thermal power plants.</td>
<td>STEG</td>
</tr>
<tr>
<td>Energy Audits Sonelgaz</td>
<td>Sonelgaz</td>
</tr>
</tbody>
</table>
| 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 |  |
<p>| 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 | Algeria, Morocco |
| 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 | Nigeria |
| 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 | Activities: Technical 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 |
| 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 |</p>
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Implementing Body</th>
<th>Description</th>
<th>Sector</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCO Development of Energy Service Companies (ESCO) in Tunisia</td>
<td>Tunisia government</td>
<td>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.</td>
<td>Energy</td>
<td>Tunisia</td>
</tr>
<tr>
<td>Tunisian government Energy Efficiency Improvements in the Freight Transport System in Tunisia</td>
<td>Tunisian government</td>
<td>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.</td>
<td>Energy</td>
<td>Tunisia</td>
</tr>
<tr>
<td>STEG Program for High Efficiency Residential Lighting in Tunisia</td>
<td>STEG</td>
<td>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</td>
<td>Energy</td>
<td>Tunisia</td>
</tr>
<tr>
<td>STEG Development of Biogas</td>
<td>STEG</td>
<td>This project encourages the</td>
<td>Energy</td>
<td>Tunisia</td>
</tr>
</tbody>
</table>
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.
P
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)

<table>
<thead>
<tr>
<th>Organization</th>
<th>Type REDD &amp; LULUCF</th>
<th>Relevant focus</th>
<th>Strategies</th>
<th>Programme (Pr)/ Initiative (I)/ Projects (P)</th>
<th>Where in NORTHERN Africa</th>
<th>Website of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation - E. Reduced emission from deforestation and forest degradation (REDD) &amp; Land use, land-use change and forestry (LULUCF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

81
<table>
<thead>
<tr>
<th>Organization</th>
<th>Forestry/Industry</th>
<th>Project Description</th>
<th>Kteco2/an</th>
<th>Status</th>
<th>Country</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>COSMART MAROC</td>
<td>Biodiesl Maroc</td>
<td>Stage PIN</td>
<td>618.7</td>
<td>P</td>
<td>MOROCCO</td>
<td><a href="http://www.cdmmorocco.ma">http://www.cdmmorocco.ma</a></td>
</tr>
<tr>
<td>The National Phosphatees Office</td>
<td>forestry</td>
<td>Rehabilitation of open mining sites in Khouribga</td>
<td>Kteco2/an 16.5</td>
<td>Under development</td>
<td>P</td>
<td>MOROCCO</td>
</tr>
<tr>
<td>Eucaforest</td>
<td>forestry</td>
<td>Eucalyptus planting</td>
<td>Kteco2/an 67</td>
<td>Under development</td>
<td>P</td>
<td>MOROCCO</td>
</tr>
<tr>
<td>The High Commission in Charge of Forest and Combating Desert</td>
<td>forestry</td>
<td>Utilization of argane trees and cacti in the reforestation of semi-arid areas</td>
<td>Kteco2/an 40</td>
<td>Under development</td>
<td>P</td>
<td>MOROCCO</td>
</tr>
<tr>
<td>St - Microelectronics</td>
<td>forestry</td>
<td>Reforestation of 10,000ha in the Maamora Forest</td>
<td>Kteco2/an n.d</td>
<td>Under development</td>
<td>P</td>
<td>MOROCCO</td>
</tr>
<tr>
<td>NEPAD</td>
<td>Combating land degradation, drought and Desertification</td>
<td>Green belt: Conservation and sustainable use of natural resources in the Maghreb countries</td>
<td></td>
<td></td>
<td>P</td>
<td>UMA</td>
</tr>
<tr>
<td>FAO</td>
<td>Land use change and forestry</td>
<td>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</td>
<td></td>
<td>P</td>
<td>Algeria, Egypt, Morocco, Tunisia</td>
<td><a href="http://www.fao.org/forestry/site/fra2005">http://www.fao.org/forestry/site/fra2005</a></td>
</tr>
<tr>
<td>START GEC Research: Africa</td>
<td>Forestry</td>
<td>GEC Research: Africa</td>
<td>Inventory and mapping pine populations in Morocco using satellite data and evaluation of their physiological response to environmental stresses</td>
<td></td>
<td>P</td>
<td>Morocco</td>
</tr>
</tbody>
</table>

**Mitigation –F**

**F. International carbon market**
<table>
<thead>
<tr>
<th>Organization</th>
<th>Type Carbon Market</th>
<th>Relevant focus</th>
<th>Strategies</th>
<th>Programme (Pr)/ Initiative (I)/ Projects (P)</th>
<th>Where in NORTHERN Africa</th>
<th>Website of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mitigation – F. International carbon market</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 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 |
<p>| ANGED/MEDD | Landfill Gas | Landfills of Tozeur-Mahdia- | PIN approved by DNA | P | Tunisia |</p>
<table>
<thead>
<tr>
<th>Recovery</th>
<th>Zaghouan</th>
<th>t CO2/an</th>
<th>47 619</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANME</td>
<td>Energy</td>
<td>Solar heating scaling-residential + tertiary</td>
<td>PIN approved by DNA t CO2/an 57 000</td>
</tr>
<tr>
<td>SCG</td>
<td>Energy</td>
<td>Installation of wind farm for electricity production in the GABES Cement plant</td>
<td>PIN approved by DNA t CO2/an 21 200</td>
</tr>
<tr>
<td>CIOK</td>
<td>Energy</td>
<td>Implementation of a wind farm near the site of d’Oum el Kéli (CIOK)</td>
<td>PIN approved by DNA t CO2/an 21 200</td>
</tr>
<tr>
<td>ANME</td>
<td>Energy</td>
<td>Rural electrification and water supply by solar photovoltaic</td>
<td>PIN approved by DNA t CO2/an 1700</td>
</tr>
<tr>
<td>Office du Commerce de Tunisie (OCT)</td>
<td>Energy</td>
<td>Improving energy efficiency by distributing 2 million low-consumption lamps LBC</td>
<td>PIN approved by DNA t CO2/an 27 600</td>
</tr>
<tr>
<td>STEG/industr. Zone Menzel Hayet</td>
<td>Energy</td>
<td>Substitution of petroleum products by natural gas (project Gafsa and Jammel/Zeramdinne and Menzel Hayett)</td>
<td>PIN approved by DNA t CO2/an 24 000</td>
</tr>
<tr>
<td>STEG/industr. Zone Jammel/Zeramdinne</td>
<td>Energy</td>
<td>Substitution of petroleum products by natural gas (project Gafsa and Jammel/Zeramdinne and Menzel Hayett)</td>
<td>PIN approved by DNA t CO2/an 41 600</td>
</tr>
<tr>
<td>CP Gafsa/ANME</td>
<td>Energy</td>
<td>Project of solar drying phosphates</td>
<td>PIN approved by DNA t CO2/an 35 700</td>
</tr>
<tr>
<td>STEG</td>
<td>Energy</td>
<td>Wind farm of Sidi Daoud (35 Mw)</td>
<td>PIN approved by DNA t CO2/an 57 700</td>
</tr>
<tr>
<td>ETAP</td>
<td>Energy</td>
<td>Recovery of oilfield associated gas (flaring), Mamoura (Nabeul)</td>
<td>PIN approved by DNA t CO2/an 380 000</td>
</tr>
<tr>
<td>Energy</td>
<td>Energy</td>
<td>Recovery of associated gas (flaring) oilfield Jebel Grouz (Tataouine)</td>
<td>PIN approved by DNA t CO2/an 80 000</td>
</tr>
<tr>
<td>Company</td>
<td>Sector</td>
<td>Description</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>SOTIPAPIER</td>
<td>Energy</td>
<td>Installation of a cogeneration in a stationery</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>Groupe Poulina</td>
<td>Energy</td>
<td>Installation of cogeneration in 5 companies of the Group Poulina (SNA, Al Mazra, TEC TPAP, STIBOIS, GIPA)</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>Groupe Poulina</td>
<td>Energy</td>
<td>cogeneration in 4 Business Group Poulina (Ceramique Sfax, Complexe Sidi Saleh, STIBOIS -Bir Kasaa, Couvoirs Cédria)</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>AGRIMED</td>
<td>Energy</td>
<td>Production of electricity from olive pulp Generation (40 MW)</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>Cimenterie de Jebel Oust (CJO)</td>
<td>Energy</td>
<td>Installation of wind turbines to produce electricity in Cement Jebel Oust (CJO)</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>ANME</td>
<td>Energy</td>
<td>Dissemination of 8 million Lamps Low consumption over the period 2009-2012 in Tunisia</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>Société Tunisienne de Production de Biodiesel (STP-B)</td>
<td>Energy</td>
<td>Project Recovery vegetable oils and their processing into biodiesel</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>Ministère de l'Agriculture</td>
<td>Agriculture</td>
<td>Biocarburants - Jatropha (15 000 ha)</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>Ministère de l'Agriculture</td>
<td>Agriculture</td>
<td>forestation (Pinus and Eucalyptus planting ) area 15 440 ha</td>
<td>PIN approved by DNA</td>
</tr>
<tr>
<td>Ministère de Transport</td>
<td>Transport</td>
<td>Project RFR et Other components - urban Greater Tunis</td>
<td>PIN approved by DNA</td>
</tr>
</tbody>
</table>
| 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. | PIN approved by DNA | 38.1 GWh/year, will ensure about 50% of Moroccan}
<table>
<thead>
<tr>
<th>Organization</th>
<th>CDM-PDD</th>
<th>Project Name</th>
<th>Description</th>
<th>Country</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE (Office Nationale d' Electricité)</td>
<td>CDM-PDD</td>
<td>Essaouira wind power Project</td>
<td>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.</td>
<td>P</td>
<td>Morocco <a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
</tr>
<tr>
<td>Office National de l’Electricité ONE</td>
<td>CDM-SSC-PDD</td>
<td>Small-scale Photovoltaic kits</td>
<td>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.</td>
<td>P</td>
<td>Morocco <a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
</tr>
<tr>
<td>Agence pour l’Amenagement de la</td>
<td>CDM-SSC-PDD</td>
<td>Small-scale Methane recovery &amp;</td>
<td>The project aims at investing in a biogas collection system, a blower and flaring system at the landfill site.</td>
<td>P</td>
<td>Morocco <a href="http://cdm.unfccc.int/Reference/Documents">http://cdm.unfccc.int/Reference/Documents</a>.</td>
</tr>
<tr>
<td>vallee du Bouregreg (AABR)</td>
<td></td>
<td>utilization</td>
<td>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.</td>
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<tr>
<td>Surac SA UK EcoSecurities Group Plc</td>
<td>CDM-SSC-PDD</td>
<td>Small-scale Biomass</td>
<td>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.</td>
<td>P</td>
<td>Morocco <a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
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<tr>
<td>Société Briqueterie</td>
<td>CDM-SSC-PDD</td>
<td>SBBC Fuel Switch Project</td>
<td>The project activity will reduce P</td>
<td>P</td>
<td>Morocco <a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
</tr>
<tr>
<td>Bati Chaouia</td>
<td>renewable energy</td>
<td>The project activity takes place at SBBC Societe Briqueterie Bati Chaouia brick works</td>
<td>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 nutshell and residual wood.</td>
<td>o.ma</td>
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<tr>
<td>Régie Autonome Multi-Services d’Agadir RAMSA</td>
<td>CDM-SSC-PDD Wastewater Treatment</td>
<td>RAMSA – Biogas recovery and electricity generation from M’zar Wastewater treatment plant, Morocco</td>
<td>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</td>
<td>P</td>
<td>Morocco</td>
</tr>
<tr>
<td>ECOMED GESTION DE DECHETS</td>
<td>CDM-PDD Landfill Gas Flaring</td>
<td>Fes New Landfill Gas Recovery Reuse and Flaring Project</td>
<td>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</td>
<td>P</td>
<td>Morocco</td>
</tr>
<tr>
<td>GIE Al Wahdaoui</td>
<td>CDM-PDD Renewable energy</td>
<td>Greenhouse Gas Emission in the Fish Meal Industry in Morocco – Central Steam Production Plant</td>
<td>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.</td>
<td>P</td>
<td>Morocco</td>
</tr>
<tr>
<td>Office Chérifien des Phosphates (OCP)</td>
<td>CDM-PDD energy efficiency</td>
<td>Jorf Lasfar heat recovery enhancement for power project</td>
<td>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 Phosphate</td>
<td>P</td>
<td>Morocco</td>
</tr>
<tr>
<td>Community of Rabat, Morocco</td>
<td>PDD approved by DNA</td>
<td>Rabat Akreuch landfill biogas collection and flaring</td>
<td>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.</td>
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<td>Morocco</td>
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<tr>
<td>Prepared for the By EcoSecurities in collaboration with Clean Tech</td>
<td>Landfill biogas collection and flaring</td>
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<tr>
<td>NAREVA Holding</td>
<td>PDD approved by DNA</td>
<td>Renewable energy</td>
<td>Haouma wind farm project 60 MW</td>
<td>Reduction of GHG emissions in accordance with the objectives of the UNFCC</td>
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<td></td>
<td>Renewable energy</td>
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<tr>
<td>LAFARGE - Maroc</td>
<td>PDD approved by DNA</td>
<td>Renewable energy</td>
<td>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</td>
<td>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</td>
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<td>Renewable energy</td>
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<tr>
<td>Office National de l’Electricité</td>
<td>Renewable energy</td>
<td>Wind farm Tangiers (140 MW)</td>
<td>PDD approved by DNA</td>
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<tr>
<td>Office National de l’Eau Potable</td>
<td>PDD approved DNA</td>
<td>Renewable energy</td>
<td>Renewable electricity generation by the user &amp; for the grid (type 1-A &amp; 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.</td>
<td>The generated electricity will be partly used in the desalinisation plant and partly sold to the national grid</td>
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<td></td>
<td>Renewable energy</td>
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<tr>
<td>Maroc Phosphore I</td>
<td>Energy efficiency</td>
<td>The project is to improve the</td>
<td>The system allows the increase of</td>
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<tr>
<td>Project Details</td>
<td>Description</td>
<td>Approval Details</td>
<td>Website</td>
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<td><strong>Commune Urbaine de Marrakech</strong></td>
<td>Solid waste Public landfill</td>
<td>Biogas recovery and flaring/valorization in Marrakesh</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<td>NIP approved by DNA</td>
<td><em><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></em></td>
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<tr>
<td><strong>Commune Urbaine de Fès</strong></td>
<td>Solid waste Public landfill</td>
<td>Biogas recovery and flaring/valorization Fès</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<td>NIP approved by DNA</td>
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<tr>
<td><strong>Office National de l'Electricité</strong></td>
<td>Renewable energy</td>
<td>Taza wind farm (100 MW)</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td><strong>Office National de l'Electricité</strong></td>
<td>Renewable energy</td>
<td>hydroelectric management of the Tanafnit-Elborj (40 MW)</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td><strong>Office National de l'Electricité</strong></td>
<td>Renewable energy</td>
<td>hydroelectric management of the Tillouguit (32MW)</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td><strong>CIMENTS DU MAROC</strong></td>
<td>NIP approved by DNA</td>
<td>Installation of a 10MW wind farm close to the Indusahaga grinding center, approximately 18km</td>
<td>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</td>
<td>Morocco</td>
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<td></td>
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<td>distance from Laayoune, 21.6m asl.</td>
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<td><em><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></em></td>
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<tr>
<td><strong>Commune Urbaine de Marrakech</strong></td>
<td>Waste water treatment</td>
<td>effluent treatment in Marrakech : production of electricity from biogas</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td><strong>Office National de l'Electricité</strong></td>
<td>Renewable energy</td>
<td>Parc Eolien de Taza (100 MW)</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td><strong>Office National de l'Electricité</strong></td>
<td>Renewable energy</td>
<td>Project hydroelectric management of the Tanafnit-Elborj (40 MW)</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td>Lesieur-Cristal</td>
<td>Biomass Energy</td>
<td>Proposed use of waste oil as fuel</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<td><em><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></em></td>
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<tr>
<td><strong>Commune Urbaine de Kenitra</strong></td>
<td>Solid waste Public landfill</td>
<td>Biogas recovery and flaring/valorization in Ouled Berja (kenitra)</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td>Targa-aide</td>
<td>Energy efficiency</td>
<td>Generating electricity from renewable energy for an Integrated development of the Ouneine Valley, High Atlas</td>
<td>NIP approved by DNA</td>
<td>Morocco</td>
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<tr>
<td>Organization</td>
<td>Sector</td>
<td>Description</td>
<td>Status</td>
<td>Country</td>
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<tr>
<td>MAPHAR Sanofia Aventis</td>
<td>Energy efficiency</td>
<td>Energy efficiency measures and energy thermal solar production for hot water MAPHAR Sanofia Aventis</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
</tr>
<tr>
<td>Union Cérame</td>
<td>Renewable energy</td>
<td>Installation of a cogeneration system to LPG (10 MW) in Union Cérame</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
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<tr>
<td>DIMATIT</td>
<td>Renewable energy</td>
<td>Wind farm DIMAVERT 10 MW</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
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<tr>
<td>Caisse de Dépôt de Gestion</td>
<td>Gestion des déchets</td>
<td>Recovery and flaring of landfill biogas El Jadida</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
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<tr>
<td>Office Chérifien des Phosphates</td>
<td>Energy efficiency</td>
<td>Change in the treatment of phosphate (dry to wet) and Pipe Youssoufia - Safi</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
</tr>
<tr>
<td>LAFARGE - Maroc</td>
<td>Renewable energy</td>
<td>First Windfarm extension of the Lafarge cement Tetouan (10 MW)</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
</tr>
<tr>
<td>Tangier Industrial Zone Association AZIT</td>
<td>Renewable energy</td>
<td>2MW wind-energy for a plastic firm in Tangiers</td>
<td>PIN under development</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
</tr>
<tr>
<td>Tangier Industrial Zone Association AZIT</td>
<td>Efficacité énergétique</td>
<td>A2x10 MW win energy at the Tangiers Industrial park : Dalia 1 and Dalia 2</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
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<tr>
<td>ECOMED GESTION DE DECHETS</td>
<td>Solid waste Public landfill</td>
<td>Biogas recovery and flaring/valorization in Mediouna (Casablanca)</td>
<td>PIN under development</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
</tr>
<tr>
<td>Communes Rabat et Marrakech</td>
<td>Energy efficiency</td>
<td>Installation of 350 000 electronic power cut-out LBC</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
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<tr>
<td>Office Chérifien des Phosphates</td>
<td>Energy efficiency</td>
<td>Recycling seawater (Jorf Lasfar)</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
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<tr>
<td>Renault Maroc</td>
<td>Biomass Energy</td>
<td>alternative Use of biomass energy</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
</tr>
<tr>
<td>MANAGEM</td>
<td>Renewable energy</td>
<td>Recovery of waste heat and cogeneration (4 MW) by the</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc.o.ma">http://www.cdmmorocc.o.ma</a></td>
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<tr>
<td>Organization/Project</td>
<td>Sector</td>
<td>Activity</td>
<td>Description</td>
<td>Location</td>
<td>Website</td>
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<td>Cellulose du Maroc</td>
<td>Waste</td>
<td>valorization of the pyrrhotite</td>
<td>reducing methane emissions from the wastewater treatment plant of pulp Cellulose in Morocco</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
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<tr>
<td>Office National de l’Electricité</td>
<td>Energy efficiency</td>
<td>Program for domestic lighting by low consumption lamps (LBC) ten million lamps Program</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
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<tr>
<td>Association de la Zone Industrielle de Tanger AZIT</td>
<td>Renewable energy</td>
<td>Speed variation at the level of compressed air: 20 industries within the plastic sector</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
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<tr>
<td>Gestion des déchets</td>
<td>Gestion des Solid waste under development</td>
<td>Bio gas recovery and flaring valorization (Mediou na) Casablanca</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
</tr>
<tr>
<td>Office Chérifien des Phosphates</td>
<td>Energy Efficiency under development</td>
<td>Change in the treatment of phosphate (dry to wet) and Pipe Khouribga - Jorf Lasfar</td>
<td>PIN in progress</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
</tr>
<tr>
<td>NAREVA Holding: was created in 2005 by ONA Group to manage its activities in the energy and environment sector.</td>
<td>(CDM PDD) Renewable energy</td>
<td>Foum El Wad Wind Farm Project</td>
<td>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.</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
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<tr>
<td>NAREVA Holding</td>
<td>Renewable energy (CDM PDD)</td>
<td>Akrfenir Wind Farm Project – Morocco</td>
<td>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</td>
<td>Morocco</td>
<td><a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma</td>
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<tr>
<td>Description</td>
<td>Action</td>
<td>Project Details</td>
<td>Location</td>
<td>Website</td>
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<td>NAREVA's clients in the context of the new regulatory framework in Morocco (the new Law 16.08) and “EnergiPro” program.</td>
<td></td>
<td>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.</td>
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<tr>
<td>The Fez Urban Commune RADEF</td>
<td>Solid waste Public landfill</td>
<td>Recuperation and bio-gas burning in Fez</td>
<td>PIN underdeveloppement</td>
<td>Morocco</td>
<td>[<a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma](<a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma)</td>
</tr>
<tr>
<td>Office National des Aéroports (ONDA)</td>
<td>Renewable energy CDM-SSC-PDD</td>
<td>Electricity supply by photovoltaic solar energy of airports in Morocco</td>
<td>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)</td>
<td>Morocco</td>
<td>[<a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma](<a href="http://www.cdmmorocc">http://www.cdmmorocc</a> o.ma)</td>
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<tr>
<td>Ministry of Transport, National Authority for Tunnels</td>
<td>Transportation</td>
<td>Line 3 Greater Cairo Metro Network</td>
<td>The 3rd line includes 29 stations. The technology to be employed is similar to the previously used upon establishment of line 1 &amp; line 2</td>
<td>Egypt</td>
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<td>Ministry of Transport Tramway Rabat Société Tramway de Rabat-Salé » (STRS)</td>
<td>Transportation</td>
<td>Tramway and Metro</td>
<td>Installation and fitting out of fixed equipment for all systems on line 1 phase 1 of the Rabat-Sale, Marrakesh tramways and Casablanca Metro</td>
<td>Morocco</td>
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<tr>
<td>Entreprise du Métro d’Alger (Algiers Metro Company - EMA) has awarded the SYSTRA /RATP</td>
<td>Transportation</td>
<td>Metro Algiers</td>
<td>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.</td>
<td>Algeria</td>
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<tr>
<td>CArbon Egypt Ltd. Kommunalkredit Public Consulting GmbH</td>
<td>CDM N2O decomposition</td>
<td>N2O decomposition CDM-PDD AM0028 large</td>
<td></td>
<td>Egypt</td>
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<tr>
<td>Onyx Alexandria for Complementary Services in Waste Treatment S.A.E Spain, Ministerio de</td>
<td>CDM Methane recovery</td>
<td>Methane recovery &amp; utilization Support sustainable development</td>
<td>Landfill gas flaring CDM-PDD ACM0001 large</td>
<td>Egypt</td>
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<tr>
<td>Medio Ambiente Veolia Proprete</td>
<td>Wind power</td>
<td>Development of Wind Energy for Electricity Generation in</td>
<td>CDM-PDD ACM0001 large</td>
<td>P</td>
<td>Egypt</td>
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<td>Alexandria Carbon Black Company S.A.E.</td>
<td>Waste gas/heat utilization</td>
<td>Carbon Black production process generates waste gas as a by-product &amp; utilizes this energy to generate electricity &amp; steam for its captive requirement</td>
<td>CDM-PDD AM0032- Methodology for waste gas or waste heat based cogeneration system large</td>
<td>P</td>
<td>Egypt</td>
</tr>
<tr>
<td>IDEA – Egypt Canada PEI - Europe</td>
<td>Fuel switch</td>
<td>Support sustainable development</td>
<td>Fuel switch to natural gas CDM-PDD AC M0009 large</td>
<td>P</td>
<td>Egypt</td>
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<tr>
<td>Egypt</td>
<td>Abou Zaabal Company for Fertilizers</td>
<td>Energy Efficiency PIN</td>
<td>Waste Heat Recovery GHGs: Carbon Dioxide electricity production from waste energy recovery in an industrial or manufacturing process- proposed new methodology NM 0088</td>
<td>Certified Emission Reductions (CERs) Abou Zaabal Fertilizers is owned by Polyserve Fertilizers and Chemicals group the 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</td>
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<td>Egypt</td>
<td>New &amp; Renewable Energy Authority (NREA)</td>
<td>Renewable Energy PDD</td>
<td>Zaafarana 140 MW Wind Power Plant</td>
<td>The yearly CO2 abatement in 2005 reached about 290,000 tCO2e.</td>
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<tr>
<td>Egypt</td>
<td>New &amp; Renewable Energy Authority (NREA) implemented in cooperation with Spain.</td>
<td>Renewable Energy PDD LS</td>
<td>Zaafarana 85 MW Wind Power Plant</td>
<td>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.</td>
<td>P</td>
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<tr>
<td>Egypt</td>
<td>New &amp; Renewable Energy Authority (NREA)</td>
<td>Renewable Energy</td>
<td>Zaafarana 80 MW Wind</td>
<td>Title of the baseline: ACM0002:</td>
<td>P</td>
</tr>
<tr>
<td>Energy Authority (NREA)</td>
<td>PDD</td>
<td>Power Plant</td>
<td>Consolidated Baseline Methodology for Grid – Connected Electricity Generation from Renewable Energy Sources.</td>
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<tr>
<td><strong>New and Renewable Energy Authority NREA</strong></td>
<td>Renewable Energy PIN</td>
<td>Integrated Solar Combined Cycle Power Plant (ISCC-Kuraymat)</td>
<td>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.</td>
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<tr>
<td><strong>The Aluminum Company of Egypt</strong></td>
<td>Renewable Energy PIN LS</td>
<td>Kuraymat Integrated Solar Combined Cycle Power Integrated Solar Combined Cycle System (ISCCS)</td>
<td>The project will implement the best available proven technology to reduce emissions of GHGs through reducing the time of cell upset (anode effect).</td>
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<tr>
<td><strong>The Aluminum Company of Egypt</strong></td>
<td>Industry PIN</td>
<td>Perfluorocarbon’s Emissions Reduction</td>
<td>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 hexafluoroethan(C2F6) are produced during brief process upset periods, anode effect.</td>
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<td><strong>Nitrous Oxide Emission Reduction in Nitric Acid Unit</strong></td>
<td>Industry PIN</td>
<td>Nitrous Oxide Emission Reduction in Nitric Acid Unit</td>
<td>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.</td>
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<tr>
<td><strong>El Delta Company For Fertilizers and Chemicals Industries</strong></td>
<td>Industry PIN</td>
<td>Emitted CO2 Utilization in Urea Fertilizers Industry &amp; Tail Gas Flaring Delta Company for fertilizers</td>
<td>Title of the baseline: New baseline methodology Justification of baseline scenario: • Reuse the emitted CO2 from Ammonia unit at Talkha 1 to</td>
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<tr>
<td>Company</td>
<td>Industry</td>
<td>PIN</td>
<td>Fuel Switching &amp; Reduction of Clinker Content in Cement</td>
<td>Fuel Switching and installation of additional homogenizing facilities, hoppers, weigh feeders and transportation equipment such as loaders, belt conveyors etc.</td>
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<tr>
<td>National Cement Company</td>
<td>Industry PIN</td>
<td>Fuel Switching &amp; Reduction of Clinker Content in Cement</td>
<td>Fuel switching and installation of additional homogenizing facilities, hoppers, weigh feeders and transportation equipment such as loaders, belt conveyors etc.</td>
<td>P Egypt</td>
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<tr>
<td>Dyeing Materials &amp; Chemicals (ISMADYE) Company</td>
<td>Energy Efficiency PIN</td>
<td>Technology Upgrading and Fuel Switching</td>
<td>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</td>
<td>P Egypt</td>
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<tr>
<td>Tensif Region Development Centre CDRT</td>
<td>Fuel Switching</td>
<td>Potter Kilns in Marrakech</td>
<td>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.</td>
<td>P Morocco</td>
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</tr>
<tr>
<td>Alexandria for Oil &amp; Soap</td>
<td>Fuel Switching PIN</td>
<td>Fuel Switching in Boilers, Dryers and Furnaces</td>
<td>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:</td>
<td>P Egypt</td>
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<tr>
<td>Misr Beida Dyers Company</td>
<td>Fuel Switching</td>
<td>Fuel Switching for Electricity Generation and Industrial Processes (I)</td>
<td>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.</td>
<td>P Egypt</td>
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<tr>
<td>Misr Fine Spinning &amp; Weaving</td>
<td>Fuel Switching</td>
<td>Fuel Switching for Electricity Generation and Industrial Processes (II)</td>
<td>The project involves the installation of internal and out of fence NG network, natural gas-based burners and automatic control system for the</td>
<td>P Egypt</td>
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<tr>
<td>Organization</td>
<td>Type</td>
<td>Relevant focus</td>
<td>Strategies</td>
<td>Programme (Pr) / Initiative (I) / Projects (P)</td>
<td>Where in NORTHERN Africa</td>
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<td>CEMEX Egypt (Assiut Plant)</td>
<td>Waste PIN</td>
<td>Biomass Fuel Switching The plant will utilize biomass cultivated from a farm owned by Cemex Egypt which is located near the plant.</td>
<td>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.</td>
<td>P</td>
<td>Egypt</td>
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<tr>
<td>Egyptian Environmental Affairs Agency (EEAA)</td>
<td>Afforestation PIN LS</td>
<td>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.</td>
<td>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.</td>
<td>Pr</td>
<td>Egypt</td>
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<tr>
<td>Sonatrach</td>
<td>CDM In progress</td>
<td>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.</td>
<td>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. - CO2 emissions reduction will be approximately 5.7 million tons of CO2 equivalent and a dehydration unit.</td>
<td>P</td>
<td>Algeria</td>
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</table>

C. Supporting and Enabling Measures:

**Capacity building; Finance; Technology development and transfer**

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<thead>
<tr>
<th>Organization</th>
<th>Type</th>
<th>Relevant focus</th>
<th>Strategies</th>
<th>Programme (Pr) / Initiative (I) / Projects (P)</th>
<th>Where in NORTHERN Africa</th>
<th>Website of Organization</th>
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<tr>
<td>C. Supporting and Enabling Measures:</td>
<td>Capacity building (CB); Finance (F); Technology development and transfer (TDT)</td>
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<tr>
<td>UNDP / GEF-SGP Community Based Adaptation (CBA) Programme</td>
<td>Capacity Building and Finance</td>
<td>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.</td>
<td>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…).</td>
<td>Programme Objective in Morocco: 12 CBA projects by 2011.</td>
<td>Morocco <a href="http://www.undp-adaptation.org/project/cba">www.undp-adaptation.org/project/cba</a></td>
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<tr>
<td>Sahara and Sahel Observatory, Tunis, Observatoire du Sahara et du Sahel (OSS)</td>
<td>CB TDT</td>
<td>Strategy 2010: A scientific and technical axis</td>
<td>international initiatives that contribute to sustainable development in Africa, especially the Millennium Development Goals (MDGs) and the New Partnership for Africa’s Development (NEPAD).</td>
<td>Pr Algeria Egypt Morocco Tunisia</td>
<td><a href="http://www.oss-online.org">http://www.oss-online.org</a></td>
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<td></td>
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<td>Strategy 2010: Aimed at rallying active support from</td>
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<tr>
<td>Country</td>
<td>Activity</td>
<td>Implementation Details</td>
<td>Objectives</td>
<td>Additional Notes</td>
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<tr>
<td>Egypt</td>
<td>A Research for Development axis</td>
<td>Africa’s scientific community to two strategic themes: joint management of shared water resources and environmental monitoring</td>
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<td>Morocco</td>
<td>Strategy 2010: An information axis</td>
<td>aims to give impetus to actions undertaken by members by generating synergies and fostering partnerships within the OSS community.</td>
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<tr>
<td>Tunisia</td>
<td>OSS Swiss Agency for Development and Cooperation (SDC)</td>
<td>establishment and strengthening of national mechanisms for environmental surveillance « Dispositifs Nationaux de Surveillance Environnementale », DNSE</td>
<td>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.</td>
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<td>Algeria</td>
<td>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</td>
<td>The project, known officially in French as &quot;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&quot; 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.</td>
<td>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 1:500000.</td>
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<td>Algeria</td>
<td>Sahara and Sahel Observatory, Tunis, Observatoire du Sahara et du Sahel (OSS)</td>
<td>Contribution to the implementation of the NEPAD environment component by focusing on the mastery of useful information for decision-making</td>
<td>-Combating desertification and mitigating the effects of droughts: -Preventive management of foreseeable impacts of climate changes, -Sound management of transborder natural resources:</td>
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<td>Algeria</td>
<td>Global Facility for Primary Nature</td>
<td>The objective of this activity is Institutional</td>
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<tr>
<td>Disaster Reduction and Recovery (GFDRR)</td>
<td>to place disaster risk management on the development agenda for the MENA Regional VP.</td>
<td>Capacity and Consensus Building for Disaster Risk Reduction (Includes Advocacy and Training) <em>Secondary Nature:</em> Knowledge and Capacity Enhancement for Disaster Risk Reduction <em>Expected Outcomes:</em> An established DRR unit in the organization <em>Output Indicators:</em> Organizational development  <em>Primary Deliverable:</em> Analytical Publications, incl. formal ESW and AAA</td>
<td>Egypt Libya Morocco Tunisia</td>
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<tr>
<td>START Swedish International Development Cooperation Agency (Sida)</td>
<td>CB Building Long-Term Capacity for Managing &amp; 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</td>
<td>Pr Egypt Morocco [<a href="http://start.org/program">http://start.org/program</a> s/building-long-term- capacity-africa](<a href="http://start.org/program">http://start.org/program</a> s/building-long-term- capacity-africa)</td>
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<td>GTZ Ministry of Agriculture and Water Resources (MARH); General Directorate of Agricultural Studies and Development (DGEDA)</td>
<td>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.</td>
<td>P Tunisia <a href="http://www.gtz.de/de/dokumente/en-climate-results-maghreb">http://www.gtz.de/de/dokumente/en-climate-results-maghreb</a></td>
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<td>CCAA CDRT</td>
<td>CB Climate Change in the Maghreb: Threshold and limits Participants identified the followings potential actions to better cope with</td>
<td>I Morocco [<a href="http://www.ucam.ac.ma/cca">www.ucam.ac.ma/cca</a> m](<a href="http://www.ucam.ac.ma/cca">http://www.ucam.ac.ma/cca</a> m)</td>
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<td>UCAM OSS Diversitas Maroc IDRC DFID</td>
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<td>to adaptation</td>
<td>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</td>
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<tr>
<td>GTZ</td>
<td>Ministry of the Environment and Sustainable Development, Ministries of Agriculture and Water Resources, Public Health, Tourism, and Industry and Energy; the private sector</td>
<td>CB TDT</td>
<td>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.</td>
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<td>GTZ</td>
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<td>CB</td>
<td>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 Under construction</td>
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<td>GTZ</td>
<td>Moroccan State Secretariat of</td>
<td>CB</td>
<td>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</td>
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<td>Environment</td>
<td>Morocco: Clean Development Mechanism</td>
<td>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.</td>
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<td>The African Climate Change Fellowship Program START (ACCFP)</td>
<td>Co-Host institutions: University Cadi Ayyad Marrakech and Centre de Dévelopement de la Région de Tensift (CDRT)</td>
<td>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.</td>
<td>Pr Morocco <a href="http://start.org/programmes/accfp">http://start.org/programmes/accfp</a></td>
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<tr>
<td>Ecole Nationale Forestière d'Ingénieurs (ENFI)</td>
<td>Crosscutting Issues, Gender</td>
<td>assess population vulnerability to, and socio-economic consequences of, climate change impacts arising from sea level rise, coastal flooding, and associated extreme weather events.</td>
<td>ACCMA Morocco <a href="http://www.pik-potsdam.de/~kropp/acccma/index.html">http://www.pik-potsdam.de/~kropp/acccma/index.html</a></td>
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<tr>
<td>Libya government UN</td>
<td>Hardware, and Publications Laboratory and Field Equipments, software</td>
<td>Upgrading and renewal of laboratories, equipments and computer facilities</td>
<td>Libya</td>
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<tr>
<td>Drynet</td>
<td>Strengthening civil society</td>
<td>Building capacity for participation</td>
<td>Morocco <a href="http://www.dry-net.org">www.dry-net.org</a></td>
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</table>
| **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 tradeoffs 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. |

| **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  
| Deliberables  
| Identification of potential CDM projects  
| Prepare a project Development Document  
| A template for a Project Idea Note (PIN) |

| **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. |

| **Libya, UN**  
| **CB** | Capacity Building  
|  
| Training GWA staff members in different fields of water resources management |

| **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 (Ohanel), and for which a Project Development Document (PDD) has been made. |

| **DESERTNET**  
| **CB** | Implementation of a Platform  
|  
| Capacity building |

<p>| Egypt | <a href="http://www.idrc.ca">http://www.idrc.ca</a> |
| Algeria | <a href="http://cdmalgeria.org/">http://cdmalgeria.org/</a> |
| Morocco | <a href="http://www.inra.org.ma">http://www.inra.org.ma</a> |
| Libya | <a href="http://cdmalgeria.org/">http://cdmalgeria.org/</a> |</p>
<table>
<thead>
<tr>
<th>Country</th>
<th>Project Name</th>
<th>Description</th>
<th>Status</th>
<th>Funding Sources</th>
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<tbody>
<tr>
<td>Egypt, Morocco, Tunisia</td>
<td>TDT F</td>
<td>of Services to combat desertification and drought through a system of pilot actions in the Mediterranean Regions Protecting the existing forest ecosystems Combating erosion and sand dunes deposit Data collection, analysis, monitoring Increasing water availability Networking, participatory processes and partnership building</td>
<td>P</td>
<td>The World Bank - Metap Regional Facility (Metap) Agence Nationale de Protecion de L'environnement (ANPE)</td>
</tr>
<tr>
<td>Algeria, Egypt, Morocco, Tunisia</td>
<td>CB TDT F</td>
<td>Regional Solid Waste Management Project in METAP Mashreq and Maghreb Countries Project activities are carried out at both regional and national levels.</td>
<td>P</td>
<td>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</td>
</tr>
<tr>
<td>Algeria, Egypt, Morocco, Tunisia</td>
<td>CB, F, TDT</td>
<td>Assessment of Impacts, Adaptation, and Vulnerability to Climate Change in North Africa: Food Production and Water Resources</td>
<td>P</td>
<td>North Africa</td>
</tr>
<tr>
<td>Algeria, Egypt, Morocco, Tunisia</td>
<td>CB, F, TDT</td>
<td>Technology Transfer and Adaptation</td>
<td>P</td>
<td>Technology Transfer and Adaptation</td>
</tr>
<tr>
<td>Project Title</td>
<td>Task</td>
<td>Summary</td>
<td>Location</td>
<td></td>
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<tr>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
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<tr>
<td>Concentrating Solar Power for Mediterranean Region (MED-CSP)</td>
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<td>thermal power (CSP) technology in a MENA coastal area with arid or semi-arid climate,</td>
<td></td>
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<tr>
<td>TIGER ESA Initiative</td>
<td>TRANSFER</td>
<td>GOCE gravity field processing by robust techniques. Objective is to test robust methods such</td>
<td>Algeria</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>as Huber’s M-Estimator and R-Estimators in their robustness properties and computational</td>
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<tr>
<td></td>
<td></td>
<td>time comparable to the standard least squares approach by using optimized algorithms.</td>
<td></td>
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</tr>
<tr>
<td>TIGER ESA Initiative</td>
<td>TDT</td>
<td>The main objective of the proposed project is to investigate novel methods exploiting the</td>
<td>Algeria</td>
<td></td>
</tr>
<tr>
<td>National Centre of Space Techniques</td>
<td></td>
<td>full polarimetric mode of ALOS PALSAR instrument in earth terrain components classification</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>in the framework of Announcement of Opportunity for ALOS ADEN data for scientific research.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>The estimated project duration is about two years.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Project Preparation: Literature survey and review</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Data acquisition: Data will be requested for non-default mode acquisitions during Cycle 7.</td>
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<tr>
<td></td>
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<td>- Acquisition of further ground truth data.</td>
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<tr>
<td></td>
<td></td>
<td>- Data processing and analysis: will start with the reception of the data.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- PALSAR polarimetric processing.</td>
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<tr>
<td></td>
<td></td>
<td>- Development of methods for land cover classification.</td>
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<tr>
<td></td>
<td></td>
<td>- Analysis and interpretation of the results.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Writing of final report.</td>
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</tbody>
</table>

<p>| TIGER ESA Initiative                                                         | TDT  | Contribution of the satellites data (radar and optics) for the hydrogeologic prospection in | Algeria  |
| National des Techniques Spatiales - CNTS                                     |      | arid region: Case of Tindouf (SW-Algeria)                                                   |          |
|                                                                              |      | The Methodology proposed is Geologic and hydrogeologic analysis of the study area:          |          |
|                                                                              |      | - set up of geographic information system; Selection of the remote sensing data; Acquisition |          |
|                                                                              |      | of spatial data.                                                                            |          |</p>
<table>
<thead>
<tr>
<th>TIGER ESA</th>
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</thead>
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<tr>
<td>Université des Sciences &amp; de la Technologie- USTHB</td>
</tr>
<tr>
<td>TDT</td>
</tr>
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# ANNEX 2. LIST OF PERSONS CONTACTED

## ALGERIA

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Institution/Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mourad BRIKI</td>
<td>Forest Conservation of Batna, Forest General Direction, Algeria <a href="mailto:brikatmane@yahoo.fr">brikatmane@yahoo.fr</a></td>
</tr>
<tr>
<td>Mohamed SENOUCI</td>
<td>L’Institut Hydrométéorologique de Recherche d’Oran Algérie <a href="mailto:msenouci@wissal.dz">msenouci@wissal.dz</a></td>
</tr>
<tr>
<td>Leila HOUTI</td>
<td>Centre National de Recherche en Anthropologie Sociale et Culturelle Acronym CRASC</td>
</tr>
<tr>
<td>Sebastian Veit</td>
<td>Senior Climate Economist <a href="mailto:s.veit@afdb.org">s.veit@afdb.org</a></td>
</tr>
<tr>
<td>Dalila NEDJRAOUI</td>
<td>Université des Sciences et de la Technologie d’Alger <a href="mailto:dnedjraoui@yahoo.com">dnedjraoui@yahoo.com</a></td>
</tr>
</tbody>
</table>

## EGYPT

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Institution/Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essam Hassan Mohamed</td>
<td>Consultant Engineer; Climate change Expert Egyptian Environmental Affairs Agency</td>
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<td>+2101015113933 <a href="mailto:esamhasan62@yahoo.com">esamhasan62@yahoo.com</a></td>
</tr>
<tr>
<td>Guy JOBIBINS</td>
<td>Adaptation in Africa Program, Middle East and North Africa Regional Office,</td>
</tr>
<tr>
<td></td>
<td>International Development Research Centre, 8 Ahmed Nessim St, Giza, Cairo, Egypt.</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:accagjobbins@idrc.org.eq">accagjobbins@idrc.org.eq</a></td>
</tr>
</tbody>
</table>

## GERMANY

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Institution/Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jürgen GRÄBENER</td>
<td>German technical Cooperation (GTZ), Morocco <a href="mailto:Martin.tampe@gtz.de">Martin.tampe@gtz.de</a></td>
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<td></td>
<td><a href="mailto:Christian.hoepfner@Klima.TU-Berlin.de">Christian.hoepfner@Klima.TU-Berlin.de</a></td>
</tr>
<tr>
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<td>Institute for Food and Resource Economics, University of Bonn, Nussallee, Germany</td>
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<td></td>
<td><a href="mailto:arnim.kuhn@ilr.uni-bonn.de">arnim.kuhn@ilr.uni-bonn.de</a></td>
</tr>
<tr>
<td>Alexander REINHARD KASTL</td>
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</tbody>
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 Coordinateur de la composante vulnérabilité et adaptation (V&A)
Appui à la mise en œuvre CCNUCC
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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:

<table>
<thead>
<tr>
<th>Official Name</th>
<th>City</th>
<th>Country</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association pour la protection de la nature et de l'environnement (APNEK)</td>
<td>Kairouan</td>
<td>Tunisia</td>
<td>(216-77)</td>
<td>(216-77)</td>
<td><a href="mailto:apnektunisia@yahoo.fr">apnektunisia@yahoo.fr</a></td>
</tr>
<tr>
<td><em>M. Chakib Zouaghi</em></td>
<td></td>
<td></td>
<td>22-9668</td>
<td>22-9668</td>
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</tr>
<tr>
<td>Association Tunisie Mediterranée pour le développement durable</td>
<td>Tunis</td>
<td>Tunisia</td>
<td>(216-1)</td>
<td>(216-1)</td>
<td><a href="mailto:mistral@gnet.tn">mistral@gnet.tn</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>88-6591</td>
<td>88-6488</td>
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<tr>
<td>Association tunisienne des changements climatiques et du développement durable (2C2D)</td>
<td>Tunis</td>
<td>Tunisia</td>
<td>(216)</td>
<td>9740-9659</td>
<td><a href="mailto:labbene@meteo.net.tu">labbene@meteo.net.tu</a></td>
</tr>
<tr>
<td><em>M. Yadh Labane</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Association écologique pour la protection de l'environnement de la faune et la flore de la Wilaya de Bechar (AEPEFF)</td>
<td>Bechar</td>
<td>Algeria</td>
<td>(213-49)</td>
<td>(213-49)</td>
<td><a href="mailto:aepeff@yahoo.fr">aepeff@yahoo.fr</a></td>
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<tr>
<td><em>M. Zoubir Benyoulef</em></td>
<td></td>
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<tr>
<td>Association de recherche sur le climat et l'environnement (ARCE)</td>
<td>Oran</td>
<td>Algeria</td>
<td>(213-722)</td>
<td>(213-41)</td>
<td><a href="mailto:arce21@wissal.dz">arce21@wissal.dz</a></td>
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<td>41-1375</td>
<td>53-8397</td>
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<tr>
<td><em>Mr. Salah Sahabi Abed</em></td>
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<tr>
<td>Association des amis de la Saoura (AAS)</td>
<td>Béchar</td>
<td>Algeria</td>
<td>(213-49)81-1390/(213-06)26-7216</td>
<td>(213-49)</td>
<td><a href="mailto:amisaoura@hotmail.com">amisaoura@hotmail.com</a></td>
</tr>
<tr>
<td><em>M. Mohammed Bendada</em></td>
<td></td>
<td></td>
<td>81-7313</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centre de développement de la région de Tensift* (CDRT)</td>
<td>Marrakech</td>
<td>Morocco</td>
<td>(212-5)</td>
<td>(212-5)</td>
<td><a href="mailto:messouli@ucam.ac.ma">messouli@ucam.ac.ma</a></td>
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Fondation Mohammed VI pour la protection de l'environnement* (FM6E)
*Mlle Nouzha Alaoui

Groupe de recherche pour l'environnement et le développement urbain et rural (GREDUR)
*Mr. Riad Baouab