United Nations
Economic Commission for Africa
Office for North Africa

Sustainable Development and Climate Change :

How North Africa is positioning itself ?




2nd Edition

February 2011

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This publication etided by the United Nations Economic Commission for Africa(ECA) Subregional Office for North Africa provides an overview of the efforts being made by countries of the subregion to combat climate change and to seize the opportunities that come with developing a green economy.

Through an analysis of the principal mitigation and adaptation advances made by countries of the subregion and the constraints they are facing due to their vulnerability and limited capacity, this publication will try to suggest some ways and means liable to promote sustainable growth that is more environment-friendly.

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Foreword

The global debate on climate change is no longer limited to purely environmental issues, but is rather part of a wider vision, which closely links environmental goals to social and economic development goals. Controlling climate change has become one of the major challenges of national and international policy, considering how climate adversely affects economic growth and achievement of the Millennium Development Goals. The measures to be undertaken should be part of a new dynamic that ensures both short-term profits and sustainable growth, closely integrating the economic, environmental and social dimensions. There should be a shift in public policy and investments to ensure emission mitigation adjustment. These goals and imperatives will first impose a different configuration to the energy sector that is more sparing of carbon.

Mainstreaming climate activities into the development process helps to streamline and improve the efficiency and impact of utilization of financial resources, in times of global crisis. More than ever, growth and sustainable development rely on mitigating the effects of climate change and protecting the natural habitat and its resources. These challenges are closely related and call for simultaneous solutions through integrated policies, appropriate financing choices, social dialogue and efficient cooperation. Regional cooperation may also play a major role in promoting experience and best practice sharing, identifying common solutions and creating synergies, coordinating and streamlining efforts and making full use of the possibilities offered by the various initiatives.

Climate activity has the power to generate new opportunities in terms of technological innovation and creation of sustainable green jobs, particularly in key sectors such as energy, water, agriculture, construction, waste management, transport and industry. The global market for green technologies and environmental goods - estimated at 1,400 billion dollars in 2008, according to the United Nations Conference on Trade and Development - offers possibilities to developing countries to exploit their natural comparative advantages, particularly in terms of renewable energy. In this context, the substantial input by the private sector to promote innovation and financing is essential to sustaining environmentally friendly growth.

To fully adapt to emerging requirements, Africa will have to change its approach to development, consider new integrated and rational strategies,

make the necessary socio-economic adjustments by focusing on developing its technical capacities, increase the level of public investments and supporting the transformation of its economic fabric, to boost private investment.

Climate change is considered as a top priority issue by the United Nations Economic Commission for Africa. The North Africa Office supports the efforts by its made member States to ensure that the specific circumstances of the region are better known and taken into account.

While North African countries are stepping up their efforts to adapt their policies to climate change challenges, strengthen their institutional and regulatory frameworks, ensure environmental upgrade of their companies, implement innovative financing and partnership mechanisms, commitments by the international community do not match needs and opportunities. As much as the United Nations Convention on Climate Change (UNCCC) may be a unifying body while industrialised and emerging countries are striving for sustainable economic growth, commitments towards Southern countries are long in coming.

This publication provides an overview of how the region is coping with climate change. It highlights the vulnerability of the region and the potential impacts on key sectors. Significant efforts made by countries have been underlined through analysis of mitigation and adaptation measures implemented. Several suggestions have been made to guide government approach to clean development and a green economy.

Karima Bounemra Ben Soltane
Director, SRO-NA

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Global context

Broad awareness

Global warming has dramatically increased over the last fifty years (mainly since the beginning of the industrial revolution), largely (90%) due to human activities that disturbed the natural regulation system of climate. The annual growth of air emissions of carbon dioxide (CO2) and other greenhouse gases, inherent to these activities[1] represented 3.5% (2000-2007) against 0.9% (1990-1999).
CO2 air concentration led to rise in temperature, resulting in a global climate change.

The recent report of the Intergovernmental Panel on Climate Change (IPCC, 2007)[2] shows that the effects of climate change will continue to be felt and will even increase more and more in the coming years, even decades after 2015, which is the term set for the achievement of the Millennium Development Goals. According to the scenarios contemplated by the IPCC, emissions in industrialised countries should be reduced by at least 25 to 40% up to 2020 compared to the levels of 1990, to maintain the increase in global temperatures below 2 degrees.

Climate change should lead to a major decrease in global production and productivity (that could reach 20 per cent of economic production) mainly in the agriculture, fishing and tourism sectors. Several regions will suffer from water scarcity by 2020

Climate change should lead to a major decrease in global production and productivity

while a further deterioration of ecosystems is expected as well as a significant and rapid loss of biodiversity. Exceptional climate events (floods, storms, droughts, heat waves) are more and more frequent and severe in various regions of the world. In addition to the social consequences (loss in lives, starvation, disease, destruction of infrastructures, migration and conflicts), these events incur additional economic costs that put a further strain on the budgetary situation of affected countries.

[1]-The main activities concerned are linked to the use of fossil fuels contributing with 80% to CO2 emissions as well as deforestation and agriculture (17%).
[2]- IPCC : Intergovernmental Panel on Climate Change : www.ipcc.ch/

The consequences of climate change are not and will not be economic and environmental only but also social, considering the risks of upsurge of vector-borne diseases, growth in migratory flows and increase in conflicts.

Climate change will most affect regions like Africa that have contributed the least to global warming (less than 4 per cent of greenhouse gas emissions produced globally) and rendered more vulnerable by poverty, lack of financing and capacities. For all Africa, experts expect an increase in arid and semi-arid areas from 5 to 8 per cent by 2080.

The United Nations Framework Convention on Climate Change (UNFCCC)[3], signed in 1992 at the Earth Summit in Rio and the Kyoto Protocol[4], adopted in 1997, are two key international instruments being used to tackle the issue of climate change and its challenges.

Since 2005 (COP[5] 11, Montréal), when the Kyoto Protocol entered into effect, negotiations toward a post-

The international legal framework: the United Nations Framework Convention-on Climate Change and the Kyoto Protocol

The objective of the United Nations Framework Convention on Climate Change is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with climate system and allow ecosystems to adapt naturally to climate change.

The Kyoto Protocol, which buttresses the principles of the convention, is based on: (i) the historical responsibility of industrialized countries and (ii) compliance with common but differentiated responsibilities (there are three groups of countries, ranked according to their responsibilities). The Protocol emphasises the definition of targets to limit greenhouse gas emissions (the Convention does not define compulsory objectives) and provides for assistance to developing countries (cf. article 2 of the Convention. Under the Kyoto Protocol, for the 2008-2012 period, industrialised countries commit to reduce their annual emissions by at least 5 per cent below the 1990 level (baseline year).

[3]-UNFCCC: www.unfccc.int/

[4]-The Kyoto Protocol urges industrialised countries (responsible for half of greenhouse gas emissions) to reduce massively their emissions and to help Southern countries to reduce theirs and to adapt to climate change impacts, thanks to the technologies and knowledge now available.

[5]-COP: the Conference of the Parties to the convention (COC) is the supreme decision-making authority of the convention. It is made of all State parties and controls the sound implementation of the objectives of the Convention. The COC meets on an annual basis during international conferences analysing the progress of the convention and takes decisions towards reaching climate change objectives.

2012 climate policy continued first with the adoption of the Bali road map (2007), followed by the Copenhagen Accord (2009), then the Cancun Accord (2010).

The key elements of the Bali Plan of Action[6] under negotiation are:

• The need to make joint long-term efforts;

• The relationships between climate change, economic growth and sustainable development goals;

• The impact of climate change on key economic sectors (energy, transport, industry, agriculture, forestry, waste management);

• The potential of emission reduction due to deforestation and forest degradation (REDD);

• The needs in financing and technology transfer to support action on mitigation and adaptation in developing countries;

• The compliance with mitigation commitments by developed countries;

• The challenges of post-2012 Kyoto regime.

The new instruments of the Copenhagen Accord

The Copenhagen Climate Change Conference (COP 15, 2009) hoped for a binding commitment from the international community with respect to efforts to reduce emissions, so as to limit rise in average temperature to 2°c. Financing issues and technology transfer to developing countries were also high on the agenda in the negotiations. In Copenhagen, Africa took the floor for the first time with a common position. It requested industrialised countries to set ambitious goals to reduce their emissions and also pay compensation to help Africa adjust to climate change.

For the first time, Africa expressed a common Position in Copenhagen

The Copenhagen Accord ended, to the disappointment of many, with only a nonbinding declaration, where nations agreed to cooperate in reducing emissions "with a view" to scientists warnings to keep temperatures from rising more than 2°C above pre-industrial levels. It sets no internationally legally-binding emission reduction targets for developed countries. Developed countries committed to defining and achieving goals to limit greenhouse gas emissions. A

[6]-The Bali Plan of Action adopted during the Climate Change Conference in Bali (COP 13) charts the course for a new negotiating process and lists the elements to be taken into account in the future post-2012 climate regime.

The coastline is under great pressure

number of developing countries, particularly the main emerging economies agreed on implementing mitigation measures and sharing their results every two years.

To address financial and technical issues, the accord set up four new instruments:

• The Copenhagen green climate fund
• A high-level panel to examine financing issues
• A technology transfer mechanism
• A mechanism to support the reduction of emissions from deforestation and forest degradation (REDD-plus)

Developed countries also committed to jointly raise 10 billion dollars yearly over three years (2010-2012) and allocate another 100 billion dollars annually in assistance, until 2020 to help meet emission reduction and adjustment requirements of developing countries.

While this agreement is a step ahead in the international negotiation process, it still falls short of meeting expectations. Countries have not kept promises to decrease emissions and the financial support promised has not taken place yet. However, the United Nations Secretary-General set up a High-level[7] Advisory Group on Climate Change Financing to study potential sources of revenue that will enable achievement of the level of climate change financing set by industrialised countries to allocate 100 billion dollars per year by 2010. This 21- member panel (of ministers, central bank heads, experts in public finance and development) appointed for 10 months is co-chaired by the Ethiopian Prime Minister.

In its final report (November 2010), the High-level Advisory Group concluded that it was challenging but feasible to meet the 2020 goal. "This will require political will, appropriate signals from public policies to markets and financial ingenuity", according to the United Nations Secretary-General, making clear that

[7]-The United Nations High-level Advisory Group on Climate Change Financing, established in February 2010, will develop practical proposals on how to significantly scale up long term, financing for mitigation and adaptation strategies in developing countries from various public and private sources to reach the amount of 100 billion dollars per year by 2020".

funds from the public sector and the private sector would be essential.

Cancun Summit : Consolidating strides made in Copenhagen without post- Kyoto agreement

The Cancun Climate Summit (16th Conference of Parties to the United Nations Framework Convention on Climate Change and the 6th meeting of Parties to Kyoto Protocol) was held in December 2010 and attended by 193 countries. The ultimate goal of this summit was to revive the multilateral negotiation process on climate change.

Without reaching an agreement on the future of the Kyoto Protocol, the Summit confirmed the goal to limit temperature rise to less than 2°C and opened the prospect to reach a global and shared objective to reduce emissions before 2012. Participating countries have thus agreed to continue discussions on the Kyoto Protocol in Durban, in 2011 (COP17). However, today, Japan and Russia are reluctant to renew the Kyoto Protocol as long as China and the United States do not adhere to it.

Additionally, Cancun consolidates the key components of the Copenhagen Accord, particularly in terms of deforestation, technology transfer and financing. Progress has been made setting up a green fund to help developing countries to adjust to and combat warming. The richest countries promised to provide 100 billion dollars (75 billion euros) yearly until 2020, and the European Union confirmed the commitment made in Copenhagen by disbursing the first annual instalment of 7.2 billion euros under the early financing programme that will be spread to 2012. The green fund will have a board of directors with equal representation of developed and developing countries and would be managed by the World Bank for three years. However, the document adopted in Cancun does not specify the terms and conditions for the operation of the fund, particularly with regard to financing sources. This will be the subject of future discussions, as will the document on the compensation system for combating deforestation[8].

Negotiations on the future of the Kyoto Protocol will resume in 2011 in Durban

[8]-Deforestation results in nearly 15 to 20 per cent of global greenhouse gas emissions.

Key commitments of Cancun accord

Key commitments of Cancun accord National objectives of industrialised countries are officially recognised within the context of the multilateral process. These countries prepare strategies and mechanisms to reach low carbon development. They will provide an inventory report on their emissions on an annual basis.
Action in emission reduction in developing countries is officially recognised within the context of multilateral process. A record will be created to register and match the mitigation measures of developing countries and technological support from industrialised countries. To this effect, developing countries will publish a progress report every two years.
Parties to the Kyoto Protocol commit to continuing negotiations in order to complete their works and see to it that there will be no backward movement in the post-Kyoto objectives.
The Clean Development Mechanism of the Kyoto Protocol has been strengthened: large investments are expected in emission reduction projects, in developing countries. 30 billion dollars will be rapidly invested ("fast-start") by industrialised countries in order to help developing countries up to 2012. The European Union committed to bringing 7.2 billion euros. By 2020, 100 billion dollars per year should be raised.
In the area of climate finance, a Climate Green Fund has been set up with an equal representation of developed and developing countries.
Governments agreed to revive their activities to reduce emissions from deforestation and forest degradation (REDD-plus) in developing countries with technological and financial assistance.
Parties have created a climate technology centre and a network to enhance technological cooperation in adaptation and mitigation.

The Clean Development Mechanism (CDM)[9] established in Kyoto has also been upgraded. The adopted document provides for the creation of a climate technology centre, as well as a network to facilitate technology transfer in adaptation and mitigation.
Lastly, it is noteworthy that while the issue of agriculture does not appear in the document, the sector accounts for more than 13 per cent of global emissions.
Decisions on the future of the Kyoto Protocol beyond 2012 have been shelved. Negotiations about this issue will continue in 2011, in preparation for the next Conference of parties (COP 17, Durban). Compliance with the Kyoto Protocol is high on the agenda for Africa.

Finding new financing sources

In a global environment still reeling from the effects of the financial crisis of 2008-2009, the issue of climate

[9]-CDM enables developed countries to generate “carbon credits” in developing countries, through projects. The input for developing countries is represented by investments, environmental and technological benefits. Until now, this instrument has not been of great benefit to Africa (2%).

change financing is all the more critical as it will compound the macroeconomic and financial challenges facing countries. Despite the efforts made, the gap between needs and available resources remains large. Financing for adaptation and mitigation now accounts for less than 5 per cent of the annual amounts needed by 2030.

To fill this gap, additional and predictable new financing sources will have to be found through an optimal combination of mechanisms including development assistance, national policies, private sector, and carbon markets[10].

Outside the specific context of the Convention (UNFCCC), bilateral and multilateral financial instruments abound, through the creation of various carbon funds to help developing and emerging countries as well as new carbon finance stakeholders, such as the Caisse de dépôt et de consignation climat in France. According to the UNFCCC 2007 report, the private sector accounts for 86 per cent of climate change investments and financial flows.

Green growth : Another leverage for the global economy

The search for solutions for combating climate change and the effects of the multidimensional global crisis of 2007-2009 (food, energy, economic, financial) led countries to chart the course for a transition from a "fossil" dominated economy towards a green low-carbon economy. A large number of recovery plans focused on the increasing public investments in green infrastructures (renewable energy, water, transport, construction, information and communication technologies) and environment-related research and development. Support measures have also been contemplated through the implementation or strengthening of incentive measures such as environmental levies and subsidies. South Korea, for instance, devotes over80 per cent of its recovery plan on environment and green growth, the European Union 57.8 per cent, France 21.2 per cent, the United States 12 per cent and China 38 per cent (according to an HSBC report). Several countries have adopted a green growth plan. These include the

[10]-Under the Clean Development Mechanism (from Kyoto Protocol), industrialised countries may invest in emission reduction projects in developing countries, instead of initiating more expensive emission reductions in their own territories. In this way, greenhouse gas emissions can be reduced at a lower global cost.

Plan Grenelle de l'environnement, in France, the green growth plan in South Korea, the "Low carbon society" vision in Japan and the wind and solar energy development plan in China. There have also been concrete initiatives to reduce propagation of carbon footprints at all levels (public policies, private investments, financial sector, local authorities).

Recent studies and work carried out by international institutions like the Organization of Economic Cooperation and Development (OECD), the United Nations Environmental Programme (UNEP), the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) have advocated for the transition to a greener economy that will generate new opportunities in terms of technological innovation and sustainable job creation, in sectors such as energy, water and sanitation, sustainable agriculture, waste management, construction, transport, green tourism and industry. OECD is preparing its green growth strategy (2011).

To cope with climate challenges, the United Nations calls for a shift from the traditional concepts of the economy, to embark on a low-carbon growth path, designing more integrated policies and ensuring more efficient capital allocation, to solve climate and development issues at the same time. A high-level panel on sustainable growth[11] was set up in August 2010.

Investing in clean energy

The interest in clean technology development pre-dates the financial crisis, whose impact has been less perceptible on investments in this sector than others. In recent years, investments in clean energy increased by more than 400 per cent from 2004 to 2007; indeed, 20 million additional jobs could be created by 2030 (UNEP[12] Report on green jobs, 2008). In 2008, investments in power generation from renewable resources, for the first time, exceeded investments in technologies that use fossil energy (UNEP, Global Trends, 2010). The head of the International Energy Agency (IEA) recently said that to limit global warming, renewable power generation had to more than double its share in total electricity supply to 40 per cent by 2030.

[11]-The Global Sustainability Panel will present its works at the end of the year 2011 in order to prepare the United Nations Conference on sustainable development (Rio+20) that will take place in Rio de Janeiro in 2012. Made up of 21 members of civil society and key political figures, it is co-chaired by the President of Finland, Tarja Halonen and the President of South Africa, Jacob Zuma.

[12]-The joint UNEP-ILO report entitled "Towards Decent Work in a Sustainable, Low-carbon World" indicates that actions undertaken to approach climate change have already generated new jobs in various sectors and economies and could create millions of other jobs, both in industrialised and developing countries.

Negotiations for a post-2012 accord

Africa coordinates its efforts

Africa is fully committed to the fight against climate change as shown by various decisions adopted by African Union (AU) summits and other relevant ministerial conferences[13]. The continent actively participates in international climate negotiations based on the Algiers Platform (November 2008) that served as reference for the African Ministerial Conference on Environment (AMCEN).

The Economic Commission for Africa supported all the preparatory meetings towards a common African position. These include:

• The 12th Ordinary Session of the African Union (January 2009) which approved the "Algiers Declaration on Climate Change", foundation of the African position;

• The 13th Ordinary Summit of the African Union (July 2009) which established the Conference of African Heads of State and Government on Climate (CAHOSC) and gives it the mandate to represent and negotiate on behalf of all African States;

• Meetings of the African Ministerial Conference on Environment

The work carried out by AMCEN on the "African process for combating climate change" led to:

• A shared vision toward long-term concerted action to combat climate change and ensure sustainable development,

• A common position in the negotiations for a global post-2012 climate agreement.

The adoption of a common African negotiating position on the post-2012 global Agreement is an important step towards the coordination of efforts to fight climate change

This position, taken by the Summit of African Heads of State and Government (February 2009), is the basis of the African consensus on climate change.

[13]-Particularly, the African Ministerial Conference on Environment (AMCEN) and the joint annual meetings of the AU Conference of Ministers of Economy and Finance and ECA Conference of Ministers of Finance, Planning and Economic Development.

The adoption of a common African negotiating position on the post-2012 global Agreement helped to clearly define the concerns, interests and expectations of the continent. This initiative demonstrates the firm will of African States to coordinate their actions to strengthen their influence for a fairer and more equitable agreement. For Africa, it is binding on industrialized countries to comply with their quantified commitments to reduce greenhouse gas emissions beyond 2012. The continent also expects its partners to rapidly implement additional financial commitments for official development assistance, as per the Copenhagen Accord and Cancun Accord.

In October 2010, the Economic Commission for Africa organized, in conjunction with the African Development Bank and the African Union Commission, the 7th African Development Forum[14] (ADFVII) on the theme "Acting on Climate Change for Sustainable Development in Africa". The goal of this event was to deepen the debate and increase awareness on Africa's concerns and priorities, as well as strengthen its participation in international negotiations on climate change.

The Forum resulted in a Consensus Declaration highlighting the main challenges and opportunities of climate change and made recommendations coping with this change. The Declaration reiterates the need to encourage mainstreaming climate issues

Climdev-Africa programme and the African Centre for climate policies

Climdev-Africa initiative is a joint initiative of the African Union Commission, the ADB and ECA. Its overall objective is to promote climate resilient policies, climate risk management practices and the observation and management of climate data to enhance economic growth and progress towards MDGs.

- Build the capacities of decision-makers and institutions to mainstream climate change in development policies and sensitive sectors (agriculture, water, energy, health…);
- Build scientific capacities to produce and disseminate climate data;
- Support the implementation of adaptation pilot projects integrating climate information.

Climdev-Africa is consistent with the comprehensive programme for climate change adaptation, adopted by COP 12 (2006).

Finally, this initiative aims to promote the dialogue on adaptation and mitigation policies as well as sharing of best practices on climate risk management, through better integration of the various existing initiatives and networks.

The initiative is supported by a special fund managed by the ADB. The ECA ACPC is in charge of the technical secretariat.

[14]-http://www.uneca.org/adfvii/

into macroeconomic and sectoral policies and the dire need for information. ECA, the AUC and ADB set up the Climate for Development in Africa Programme (Climdev-Africa) and the African Climate Policy Centre (ACPC) to assist countries in this effort[15]. These instruments were officially launched at the Forum.

The essential issue of financing was discussed at length. The Declaration supports the plan to set up a green fund for Africa to be administered and managed by the ADB. The fund is designed to

provide more direct access to/ and equitable and transparent distribution of resources. The Forum also emphasized the importance of agriculture and scientific research and highlighted the role of the private sector, women and youth. The Declaration also recognizes the adverse impacts of climate change and depletion of natural resources on economies, as well as the opportunities offered by the transition to a green economy, as a means to revive growth, combat poverty and create jobs.

To limit greenhouse gas emissions

The outcomes of the Forum will be used to prepare a Plan of Action on climate change to be implemented jointly by ECA, the AUC and the ADB, in conjunction with UNEP and other partners.

Africa should pursue consultation and coordination efforts to strengthen its position, monitor implementation of Cancun commitments and support the negotiations on a global post-Kyoto regime (Dublin, 2012).

Taking into account the crucial role of agriculture remains a key issue in the negotiations

[15]-The establishment of the African Climate Policy Centre (ACPC) was approved in 2008, at the first meeting of African Ministers in charge of Finance and Planning, organized by ECA and AU. The objective of the African Centre is to provide guidance to member countries on climate change and support the integration of climate risk in comprehensive and sectoral policies.

The stakes for Africa are huge, considering, on the one hand, the dire consequences of climate change on the continent's sustainable development (food insecurity, desertification, water stress, high risks of conflicts, migrations…) and on the other, the opportunities for economic growth and job creation afforded by expected boost in the main business sectors that should adapt to climate change. The emergence of new niche markets such as renewable energy, organic agriculture, bio-fuels, sustainable forest management and ecotourism, for which Africa has a definite competitive edge, should help alter the way its relates to the outside world and make it a choice partner.

A comprehensive framework for African programmes on climate change, as coordination tool

The need to integrate existing and future programmes and initiatives into a consolidated framework to ensure better coordination and consistency in their implementation discussed at the 12th session of AMCEN (June 2008).

An Africa-EU cooperation programme

Africa and the European Union have been co-operating under the Africa-European Union joint strategy adopted in December 2007 at the Lisbon Summit. A plan of action (2011-2013) underlies this strategy and sets out the top priority initiatives, namely the Great Green Wall for the Sahara and Sahel initiative, ClimDev Programme, Global Climate Change Alliance, deforestation control, disaster risk management and building the capacities of African negotiators.

This led to the decision to set up a comprehensive framework for the implementation of African programmes on climate change . The framework is designed to ensure coordinated implementation and review of programmes and initiatives on climate change and sustainable development plans in Africa at the global, regional and national levels. The design of the framework is underway, and five draft sub-regional conceptual frameworks are also in various stages of preparation. The Sahara Sahel Observatory (OSS) has prepared a first version of the framework programme for North Africa in collaboration with UNEP (January, 2010).

[16]-The design of a comprehensive framework for the implementation of African programmes on climate change and its related frameworks at the sub-regional level comes within the context of the African climate change process such as adopted by the AMCEN during its 12th session (2008).

[17]-The great green wall initiative aims at implementing projects to combat desertification,soil degradation and land management in the Sahara and Sahel countries.

Impacts of climate change in North Africa
A marked vulnerability

All experts agree on the fact that North Africa, a predominantly arid and semi-arid region, will be hard hit by global warming. IPCC recent data (2007) show that temperature in Africa may rise by 2°C in the next 15 to 20 years and by more than 4°C by the end of the 21st century.

Droughts have become increasingly frequent in recent decades and worsening desertification (desert advance, deteriorating farm and grazing land, drying waterways and depleting ground water resources, etc .) and disturbing the balance of already fragile ecosystems.

This has led to significant loss in productivity in agricultural, forest and oasis areas mainly, and depletion of humid coastal areas. Desertification adversely affects 85 per cent of land in the Maghreb[18]. In Morocco, 90 per cent of the land is in various stages of threat from desertification, while 37 per cent is very sensitive to desertification[19]. Already over-exploited water resources are expected to decline by about 10 to 15 per cent on average by 2020.

The consequences of repeated floods observed in the sub-region in recent years have highlighted the extreme vulnerability of North African countries (major health, economic and environmental consequences) and their poor response capability.

The expected rise in sea level could affect the sub-region's low coastal cities, which have the highest population densities and major economic infrastructures (agricultural, industrial and of tourism). These areas are threatened by floods, erosion and flooding. Countries such as Egypt (areas of the Nile valley and Delta), Tunisia, Libya and Mauritania would be the most affected.

Climate change : Another challenge to the achievement of development goals

The vulnerability of the sub-region to climate change is exacerbated by its socio-economic context, characterized by strong demographic pressure, growing urbanization, the precarious situation of large segments of the population, overuse of natural resources

[18]-Source : Arab Maghreb Union

[19]-Source : High Commission for Water, Forests and Desertification Control

Developing new modes of agricultural production to meet food security challenge

on which economic systems highly depend and weak ecosystems, concentration of industrial and tourism activities in coastal areas, lack of infrastructures and limited institutional, technical and financial capacities. Although current data and information are not sufficient to fully and accurately assess the socio-economic impact of climate change and it resultant cost, several works and studies have highlighted the close relationships between climate change and sustainable development. It is clear from these analyses that climate change has the ability to aggravate some of the major issues facing the region (food insecurity, water deficit, desertification, poverty, migrations and conflicts, growth, budget deficit) and affect several key sectors such as agriculture, water resources, energy, industry and tourism.

According to UNDP, the main threat to sustaining development progress is the increasing non sustainability of production and consumption modes. Current energy systems are responsible for 60 per cent of total greenhouse gas emissions and thus contribute immensely to climate change.

The region is among the most vulnerable areas to climate change (food and energy security, water deficit, desertification, poverty, migrations and conflicts, growth, budget deficit)

Agricultural production threatened

Agriculture is a sensitive sector due to the high dependence on rain-fed farming (~ 50 per cent of total cultivated areas) and the predominance of grain cultivation (more than 50 per cent of useable farm area). Modelling shows that agricultural production may decrease significantly, particularly grain cultivation (decrease by 10 to 50 per cent by 2020) and vegetables (10 to 30per cent by 2030) and to a lesser extent, citrus fruits. Some crops may

[20]- UNDP-Regional Office for Arab States. Arab report on human development 2009

even disappear and new plant diseases will crop up. In Egypt, studies have confirmed the risks of flooding of the Nile Delta that threatens the productivity of farm land in this area, which has nearly one-third of the country's total agricultural production and is likely to create more than 500,000 "climate refugees". Low rainfall aggravates grazing land degradation and dries watering places, leading to major loss in livestock. Heat waves may generate a dramatic decline in poultry production. In the summer of 2003, nearly five million fowls were killed by heat in Morocco, costing the country's poultry sector 100 million Moroccan dirhams.

In view of poor agricultural policies (poor technological progress, limited use of drought risk management instruments, insufficient irrigation capacities, inadequate land management policies) and sales policies (free trade policy, European requirements) carried out up to now, climate change may have drastic consequences on already weak agricultural productivity , and agricultural trade, with adverse effects on the macro-economic (deficit in balance of payments, inflation) and social (job loss, decrease in income, food and nutritional insecurity, acceleration of rural depopulation, conflicts) situation. The 2008 food crisis and increase in prices of food products in 2010 show the sector's lack of resilience to climate disruptions and problems with self-regulation for agricultural markets.

To ensure rational management of water resources

Considering its mitigating potential and importance for economic and social development, the region should encourage the integration of agriculture in international climate negotiating processes.

Fish resources : a vulnerability risk to be assessed

While the consequences of climate change on fish resources in the region have still not been adequately assessed, studies carried out at the global level show a likely loss and geographical re-distribution of these resources due to the acidification of seas and change in sea currents. Climate change affects the seasonality of biological pathways with conse-

quences on fish production. Given that several fishing grounds are already over-exploited, their resilience to climate change will be lower. The fishery sector is one of the major pillars of economic and social development in most of the countries due to its contribution to GDP, export proceeds and employment. Assessing the vulnerability of this sector is therefore a major challenge for the countries.

Water resources : aggravated water stress

North Africa is located in the region of the world that has the lowest potential of water resources. This potential has already reached saturation point in Egypt, Libya, Tunisia, Sudan and to a lesser extent, Morocco, whose water resources are also diminishing rapidly. Indeed, according to a 2006 Ministry of Land Planning and the Environment report, the country is not far from experiencing water shortage. Climate change will aggravate the pressure dynamics on these resources and worsen the water shortage. With needs expected to rise, most of the countries could reach their limit of resources that can be economically mobilized by 2025-2030 and could even be in deficit. Egypt, which entirely depends on the Nile's water (the Nile brings more than 85 per cent of total water resources), is already experiencing a water crisis. In Libya, decrease in rainfall resulted in ground water resources nearly drying. Excessive use of some of non-renewable water sources leads to major problems of salination.

Current water resource management methods are characterized by overuse of underground reserves, low proportion of waste water treatment and various types of pollution. However, countries like Algeria, Tunisia, Egypt, Morocco and Libya are resorting to alternative supply sources like desalination, using renewable energy. Also, demand-oriented management (improved water use efficiency) is being practised in the region.

An energy sector under pressure

The demand in energy, in electric power mainly, which is highly increasing in the region (due to economic development, population growth, rapid urban development, changing lifestyles), could increase further due to the additional requirements needed to adapt to the effects of climate

Fighting desertification

chansuch as: water desalination, air-conditioning of buildings, etc. Moreover, in some countries, hydroelectric production could be affected by climate.

Fossil energy dominates supply considerably (by over 90 per cent), and even if the quantity of renewable energy produced in absolute amount increases, its share in energy supply will rise only slowly due to the simultaneous increase in demand. With regard to reduction in energy intensity, progress is still slow, except for Tunisia which has significantly improved its energy efficiency.

The sustainability of the energy sector and its resilience to climate change capacity will depend on the degree of integration of renewable energy and energy efficiency in policies on construction, building, water resources management, transport and industry. The rapid penetration of natural gas and renovation of the oldest thermal power stations are also solutions for reducing CO2 emissions and air pollution. Other options such as carbon capture and storage or nuclear energy development are being discussed.

Weakened ecosystems and vulnerable coastline

Land and coastal ecosystems are undergoing huge pressures from resource overuse, urbanisation, pollution, soil erosion and desertification. Projections available for the region show that resilience of ecosystems will be highly affected by climate change, particularly agricultural, forest, sea and coastal ecosystems as well as humid areas. Climate change could lead to the migration of native species as well as increased soil degradation. Coral reefs could be threatened by water warming, resulting in the extinction of the marine life which relies on them.

A study by the World Bank[21] on the vulnerability of urban coastal areas carried out in three countries (Egypt,

[21]-World Bank (2010) – Regional study on the vulnerability of North African coastal cities to climate change and natural disasters, by 2030.

The coastline is under great pressure

Tunisia and Morocco) highlighted flood and erosion risks due to heavy rain fall and sea level rise. According to this study, the Middle East and North Africa region would be the second most affected geographical area by rapid rise in sea level; which may adversely affect tourism and result in massive population shifts.

Increased risk of infectious diseases

The impact of climate change on health will show through increased malnutrition, resurgence of some vector, water and air-borne diseases and rise in disaster casualties (there have been increased cases of floods in recent years). According to the World Health Organization, the transmission of infectious diseases (which depend greatly on weather conditions) will surely be a major consequence of climate change[22]. Blistering temperatures contribute directly to deaths from cardiovascular or respiratory diseases, mainly with elderly. Ozone and other pollutants content in the air, which aggravate cardiovascular and respiratory diseases, will also increase with temperature.

Intensification of migrations and social conflicts

In a report prepared by UNEP[23], North Africa is mentioned as one of the regions where migratory pressures and social conflicts will rise the most due to droughts, water scarcity, decrease in agricultural potential and inappropriate policies. North Africa is already a migration destination and a transit point to Europe. ■

[22]-WHO (2009) - Global Health risks: mortality and burden of disease attributable to selected major risks.
[23]-UNEP (2007)-Climate change, security risk.

Addressing climate risks

A process of integration and adaptation

Aware of the socio-economic stakes linked to climate change and the already unavoidable consequences of warming (due to past emissions), countries now recognize the need to pursue efforts to mitigate emissions, focus on adaptation and integrate climate into their socio-economic development policies.

Preservation of the environment, integrated management of climate risks and environment-friendly growth are now included among government policy priorities. National integrated strategies, sectoral plans and major programmes are being issued in key areas. Significant efforts are to be noted in the field of regulations, and financial mechanisms are being created.

In Morocco,a $ 9 billion project to install a total capacity of 2000 MW and to prevent the emission of 3.7 million tonnes of carbon dioxide per annum

Integration of the climate dimension is at the heart of development policies and adaptation strategies

Most countries have clearly understood that climate change is an additional challenge that must now be taken into account in their development efforts. Accordingly, with the support of their technical and financial partners, they have been taking numerous steps to achieve better understanding of the phenomenon and its impacts, as well as the various levels of vulnerability (sectoral, regional, sensitive areas, vulnerable populations), while drawing up targeted and integrated strategies.

Morocco for example has just adopted a National Plan to Combat Climate Warming (2009), to be supported by a continuous process of guidance involving all the sectors concerned. The plan highlights the reduction of greenhouse gas emissions through the development and diversification of

clean energy sources[24] and the implementation of adaptation measures relying mainly on the water strategy launched in 2009 and the Plan Maroc vert pour l'agriculture (Green Morocco Plan for Agriculture, 2009). The climate issue has also been integrated in some key sectors (transport, habitat), and several bills are being drafted (on renewable energy, energy efficiency, the coastline. etc.). To ensure this integration, Morocco relies on effective meteorological forecasting and research tools developed in partnership with specialised international institutions (the World Meteorological Organization, the European Organization for the Exploitation of Meteorological Satellites, the European Centre for Medium-Range Weather Forecasts, etc.).

Moreover, monitoring of climate change mitigation and adaptation strategies now forms part of the programme for the evaluation of government policies. And Morocco has launched a participatory process for the drafting of a national charter on environment and sustainable development, as a sign of its resolve to make environmental management and sustainable development a political priority at all levels.

In Tunisia, a national strategy on climate is nearing completion. The country has drawn up a multidimensional adaptation strategy emphasizing clean development; the integration of climate in socio-economic policies and the strengthening of its system of climate monitoring (remote sensing from space) and early warning system (land-based weather network enhanced by means of automation). Tunisia has also developed adaptation strategies and/or plans in key sectors such as agriculture, health, coastline and water management. A Climate-Energy Plan is being prepared. A study is being carried out on adaptation in the tourism sector, and a coastline adaptation programme has just been launched.

The strategy for the adaptation of agriculture to climate change incorporates the conservation and rational management of water resources and

Morocco, a pioneer in meteorological forecasting and research in North Africa:

- Integration of weather and climate information in sectoral strategies;
- Modelling of climate change scenarios using an advanced mechanism.

[24]-In Morocco, a $9 billion project should result in the installation of total capacity of 2,000 MW by 2020 and prevent the emission of 3.7 million tons of CO_2 per year.

ecosystems, as well as the upgrading of the agricultural sector. This strategy includes an essential component linked to scientific research in the climate area and provides for the introduction of "climate-friendly" certification of large-scale agriculture. The strategic sector of olive oil cultivation, which is highly dependent on climatic factors, is the subject of a specific strategy designed to increase value added by raising processing capacity (to 10 per cent of total production in 2011 against 1 per cent currently). Grants covering 50 per cent of the cost of processing units and tax exemptions on imports of equipment are granted to private operators. The introduction of quality certification is also planned.

To streamline the use of water resources, Tunisia plans to increase the rate of waste water utilization from 30 per cent currently to 50 per cent in 2014 in agriculture, industry and tourism. It also plans to carry out a prospective study on the water sector and to create an electronic database of surface and underground water resources. To cope with shortages of natural resources (energy and water) and ensure adaptation to national environmental standards and to the requirements of international and especially European markets (ISO 14001 standards), Tunisia is implementing a programme for the environmental upgrading of businesses. This programme aims at helping businesses to introduce ISO 14001 environmental management systems, strengthen environmental diagnoses and audits and obtain the Tunisian environmental certification introduced in 2007.

Adaptation in the field of water management: Tunisia is seeking an increase in the rate of waste water utilization from 30 per cent currently to 50 per cent in 2014 in agriculture, industry and tourism.

Algeria's climate plan puts emphasis on renewable energy development and energy saving, natural gas recovery and exploitation and water desalination and transfer. Since 2004, Algeria has been engaged in the geological capture and storage of CO2 from natural gas purification.

Climate risks are addressed in the national environmental strategy and the National Land Use Plan (target date: 2025), as well as the Law on Coastal Development.

[25]-Tunisia is the world's fourth largest producer of olive oil and the second largest exporter after the European Union. Olive oil accounts on average for half of agricultural exports and around 6 per cent of the country's total exports, making it the fifth largest source of foreign currency.

Egypt, Morocco and Tunisia account for 95% of the total installed wind energy capacity on the continent (World Wind Energy Report, 2009)

Mauritania has incorporated climate issues into its Strategic Framework to Combat Poverty and the related plan of action (2011-2015), and places emphasis on integrated coastline management and disaster management.
Egypt has launched a strategic study on adaptation to climate change.
Although appreciable progress has been made in integrating climate issues into development policies, more efforts are required in areas such as addressing the risk linked to sea level rise and coastal erosion, as well the relationships between climate change, desertification and biodiversity[26]. These are now fairly well understood: there are several publications on this issue, and synergies have been highlighted. But real efforts to coordinate and harmonize responses to these challenges still fall well short of what is needed, not least at the global and regional levels, where the three Rio conventions continue to be implemented in a rather compartmentalized way. Yet in many areas (reforestation, use of biomass, agricultural practices, water resources management, etc.), actions may contribute simultaneously to cutting emissions, combating soil degradation and preserving biodiversity, within a comprehensive ecosystem approach. Such an approach is all the more essential in view of the need to make the best possible use of available financial resources in a context still marked by the crisis.

Algeria is moving towards a geographical approach to climate change, based on carbon budgets and mapping of vulnerability by area, as well as pilot activities in the field.

[26]- The goal of the three conventions adopted during the Rio Earth Summit (1992) is sustainable development and the sound management of natural resources. Although the provisions of these instruments are based on common concerns, no specific mechanism has been devised to meet them in a coordinated way.

Sea water desalination, one approach to adaptation

Desalination is one option in efforts to adapt to climate change. Algeria has installed capacity of 400,000 cubic metres per day and plans to bring new units into service to reach overall capacity of 2.5 million cubic metres per day by 2012. The strategic plan for the promotion of water resources in the Libyan Arab Jamahiriya gives high priority to sea water desalination, with the goal of installing total capacity of 900,000 cubic metres per day by 2012. Morocco intends to build a desalination plant processing 9,000 cubic metres per day combined with a 10 MW wind farm. Egypt plans to build a mechanic vapour compression desalination plant fed by a wind farm.

The region places its hopes in the development of renewable energy sources

Despite a huge potential for the development of renewable energy sources (especially solar and wind energy), most of the countries in the region remain highly dependent on the use of fossil fuels, which, in addition to contributing to gas emissions, place a heavy burden on the budgets of most oil-importing countries (which rely on imports to meet more than 95 per cent of their energy needs). Although this trend is expected to persist for some time, the transition towards low-carbon technologies has begun. To guarantee their energy security and cope with the growing demand (6 to 8 per cent per year on average), the countries in the region have adopted strategies and programmes and set themselves challenging goals, aiming to increase the share of renewable energies in their total energy balance significantly (by about 20 per cent by 2020) and promote energy efficiency. Today, Egypt, Morocco and Tunisia account for 95 per cent of total installed capacity in terms of wind energy

Renewable energy, energy efficiency and clean development are the core strategy issues in fighting climate change

Wind farm in the Norh of Morocco (Al Koudia Baida)

in Africa (World Wind Energy Association, World Wind Energy Report 2009).

To help achieve this ambition, countries have carried out major reforms of the institutional and regulatory framework. Specific implementing agencies or institutions have been created, laws have been enacted and new financing mechanisms have been created (an energy development fund, an energy efficiency guarantee fund, a national energy fund, a carbon fund, etc.).

Egypt is the leading producer of wind energy in the Middle East, with installed capacity of 520 MW, and is targeting production capacity of 7,200 MW by 2020. It has launched a pilot project for the construction of a first 140 MW solar power plant, and is now developing a solar farm project (150 MW) in partnership with the DESERTEC[27] initiative.

The New Renewable Energy Act, in force since 2008, encourages private investment through concessions and a preferential rate for the purchase of the power produced. The private sector is currently operating 60 per cent of the renewable energy installations.

In Morocco, renewable energies contribute up to 4 per cent of the national energy balance (excluding biomass) and are the basis for nearly 10 per cent of electricity generation, thanks to major efforts made in mobilizing water resources and building the first wind farms and photovoltaic solar systems. Under its new solar energy plan, Morocco aims to produce 2,000 MW of solar energy by 2020, or nearly 14 per cent of total energy produced in the country, and is launching a national wind farm development programme (2,000 MW by 2020). In the longer term (2020-2030), Morocco's energy strategy provides for the possible use of nuclear energy.

Energy demand is characterized by a significant growth largely due to the induced electricity demand related to the economic development and demographic changes.

Tunisia's solar energy plan (TSP 2010-2016) sets a target of 1,000 MW of renewable energy production and a reduction of 22 per cent in national energy consumption by 2016. The plan provides for the creation of an international centre for higher education in renewable energy and energy effi-

[27]- The purpose of the industrial initiative DESERTEC is to develop solar and wind energy in the Sahara desert in order to provide power to Europe (15 per cent) and the MENA region by 2050.

ciency as well as an international solar energy technology laboratory. Wind energy is also a priority. Currently, 6 per cent of the country's electricity needs are met by wind farms. The country is a participant in the DESERTEC and Transgreen[28] initiatives.

The regulatory framework promotes own production of electricity using renewable energy and cogeneration and offers scope for transmission through the national network as well as the sale of any surplus to STEG. The solar thermal panel development programme (PROSOL Thermique) made it possible to speed up the spread of solar panel technology (from 7,500 square metres installed in 2004 to 62,500 square metres in 2007). A similar programme (PROVOLT) for photovoltaic panel development is included within the TSP and should promote the development of an industry, bearing in mind the available technologies and skills as well as prospects linked to national and regional demand.

Tunisia initiated a technical and economic feasibility study for a nuclear plant that could be operational by 2020.

Algeria: Under its National Plan for Renewable Energy Development (2008-2017), Algeria emphasises the development of nuclear energy (first plant scheduled to be operational by 2020), solar thermal energy and wind energy. A 150 MW gas-solar hybrid power plant project is under way.

Mauritania is working on a plan for the development of renewable energy sources and a framework law.

The Libyan Arab Jamahiriya is drafting a sustainable energy strategy and placing emphasis on the introduction of solar systems in buildings.

However, the large-scale development of renewable energy is faced with a number of constraints, including financing, pricing, poor capacity in the public and private sectors, the regulatory framework, a small local market and the limited extent of electricity network interconnection. The long-term viability of programmes is highly dependent on the adoption of clear and targeted policies and programmes in support of renewable energy, such as loans, buy-in

The generalization of success stories will promote the development of renewable energy in the region

[28]-The purpose of the Transgreen project, which was launched on 5 July 2010 in Paris, is to study ways and means of building a submarine power transmission network to carry electricity produced from solar energy in the eastern and southern Mediterranean northwards.

schemes, power supply tariffs and tax incentives), as well as clear and predictable regulations. In this context, regional cooperation could provide sustainable solutions through a harmonized approach to energy policies, knowledge-sharing and preparation of the ground for the creation of an integrated energy market

Several national energy efficiency programmes are already under way

Energy efficiency has made little progress in the region because it is not viewed as an attractive sector for investors. The countries of the region are strengthening the political, institutional and regulatory environment by focusing on the huge potential that exists in such sectors as construction, transport, industry and electric power. Quantified targets have been set under national strategies or programmes. Morocco seeks savings of 12 to 15 per cent in energy consumption by 2020. Thanks to its proactive energy policy based on a favourable regulatory and financial system, Tunisia has succeeded in reducing its energy intensity (energy used per unit of GDP) by 20 per cent over the last 10 years, and hopes for a decline in total energy intensity of nearly 2 per cent per year. Energy efficiency agencies have been created in most of the countries, and regulations are being strengthened, for example in the key sector of construction (household appliance labelling, thermal regulation of buildings, etc.).

In the industrial sector, several countries have introduced mandatory energy audits to assess potential achievable savings. Specific funding mechanisms have been set up to support the implementation of programmes such as the energy fund in Algeria, which receives the proceeds of a tax levied on inputs used in large industries, or the Tunisian fund, drawing on a tax on new vehicle registrations as well as on the import or production of air-conditioning units.

In Algeria, the goals of the national energy programme (2010-2014) are to convert 50,000 private vehicles to LPG, introduce 5 million low-energy lamps for household use and implement the Eco-Bât programme to build 600 high-energy-efficiency houses by 2015. Currently, preparations are under way for the establishment of a fund to provide finance for businesses offering energy services (research consultancies, architects, LPG fitters, etc.).

The purpose of all these programmes is to integrate energy efficiency techniques in the main sectors, through awareness-raising, widespread use of

energy audits and performance contracts, the adoption of energy efficiency codes by sector, the introduction of incentives, the upgrading of companies and the creation of energy service companies. These programmes generally receive the support of aid donors.

Progress in the use of the Clean Development Mechanism and carbon finance

Despite its substantial potential for clean energy development, North Africa still plays only a small role in the Clean Development Mechanism (CDM)[29], with only a few CDM projects implemented. While 90 per cent of greenhouse gas emission reductions through the CDM have taken place in Asia and Latin America, only 2.5 per cent have occurred in Africa. Today, the region has around 20 projects in progress in Tunisia, Morocco and Egypt, mainly in the areas of renewable energy and energy efficiency. Efforts are being made to remove the major constraint, which is financing, and expand the project portfolio to areas such as agriculture, forestry and waste recovery.

Energy efficiency potential remains underused

In 2010, Tunisia built its first unit to recover energy from organic waste, with a biogas production capacity estimated at 2.4 GWh per year. By-products will be used as organic fertilisers in organic agriculture. The Tunisian Electricity and Gas Company has recently developed the first CDM project in the wind sector, with help from the Spanish Carbon Fund managed by the World Bank. The 34 MW produced by the plant will save the emission of an estimated 50,000 tons of CO2 equivalent per year.

Morocco has set up a carbon capital fund (2008) to support the development of projects under the CDM. The capital was contributed by the Caisse de Dépôt et de Gestion du Maroc (50 per cent), the European Investment Bank (25 per cent) and the Caisse de Dépôt et de Consignation-France (25 per cent). This fund operates in the sectors of renewable energy, energy efficiency, waste management and forestation and reforestation.

[29]-The CDM enables developed countries to generate "carbon credits" in developing countries, through projects. Developing countries receive investment and environmental and technological benefits. This instrument has so far been of little benefit to Africa (2 per cent).

In Algeria, although no CDM project has been implemented to date, studies are under way to exploit the substantial existing potential for environmental projects, particularly in the new technologies of carbon capture and storage in oil and gas fields.

There is also considerable scope for the region to develop or strengthen new niches (organic agriculture, biofuels, sustainable forest management, energy recovery from organic waste and ecotourism). The still underexploited options of raising energy efficiency and introducing CO2 capture and storage (mainly in agriculture) should be given high priority, bearing in mind their economic and environmental advantages. Other activities such as sea water desalination using solar energy, waste water utilization and electricity generation from managed rubbish dumps are being exploited.

Adaptation measures in key sectors

Where adaptation is concerned, there are currently a wide range of innovative projects, particulary in the fields of energy, water resources management, farming and grazing, industry and capacity-building.

In the water sector, countries' efforts have focused on:

- Sea water desalination combined with power production by cogeneration
- Collection and treatment of waste water for agriculture and industry. For example, Tunisia intends to increase the rate of waste water reuse from 30 to 50 per cent by 2014
- Improvement of drinking water supply networks
- Integrated management of drainage basins and interregional transfers
- Constitution of virtual reserves for use in case of drought
- Protection and management of underground water resources.

Agricultural practices have improved through the use of thriftier irrigation techniques, selected seeds and varieties which are more resistant to water stress, and soil protection techniques. Some countries focus on the development of organic agriculture (olive oil, dates, aromatic and medicinal plants, etc.). In Tunisia, this field is now considered to be of strategic importance. In 2008, the country was ranked as the second largest producer in Africa, with 285,000 hectares given over to organic crops (against 87,000 hectares in 2004). Tunisia's goal in the medium term is to reach 500,000 hectares in 2014. Aquaculture is another area to be promoted in Tunisia, with the objective of reaching 10 per cent of total production of fishery products in 2016, against 3 per cent in 2009.

Sectors	Examples of technologies and practices developed or in progress
Renewable energy	• Establishment of a national renewable energy fund • Natural gas recovery is being developed in Algeria, where a nuclear energy project is also under way (2020)
Energy efficiency	• Specific law on energy efficiency • National energy fund • Adoption of sectoral standards (such as building codes and insulation) and technical specifications • Solar energy for heating water • Dissemination of low-energy lamps • Certification and labelling • Energy audits and programme contracts • Conversion to LPG • Establishment of an observatory to assess and monitor energy efficiency in partnership with ADEME (Algeria)
Water management	• Reuse of treated waste water • Water conservation • Desalination techniques • Water transfer • Integrated management of water resources
Agriculture	• Development of more resistant crop varieties • Thriftier irrigation techniques • Soil protection techniques and restoration of degraded land • Development of rain fed agriculture • Strict application of agricultural zoning regulations • Conservation and use of local plants • Switch to organic cultivations • “Climate-friendly” label • Development of aquaculture • Integration of climate information and early warning system
Forests	• Reduction of deforestation, forestation and reforestation • Firebreaks
Waste	• Waste recycling • Energy recovery from organic waste and biogas production, with use of by-products as organic fertilizer for organic agriculture
Industry	• Adoption of environmental standards and monitoring of their application • Environmental upgrading (ISO 14001) • Carbon budget for companies
Tourism	• Ecotourism, cultural tourism, desert tourism
Coastline	• Programmes for integrated coastal zone management • Reclamation of dunes and construction of marine coastal defences • Conservation of wetlands
Financial mechanisms	• Creation of carbon funds and/or specific funds • Exploitation of the potentialities of carbon finance • Public financial incentives • Environmental taxes (application of the “polluter pays” principle) • Insurance schemes: drought insurance • Public credit guarantees

Boosting scientific research and innovation: a key challenge for the region

The North Africa region is marked in general by a shortfall in scientific and technological capabilities. This situation is due to a number of factors, including a lack of direct links between research and national development priorities, inadequate public and private funding of research (investment in R&D represents less than 1 per cent of GDP in most of the countries, except in Tunisia (1.25 per cent of GDP in 2009)), the absence of a critical mass of researchers (inappropriate training, unattractive salaries, massive brain drain), weak interactions between researchers and industries (mismatch between research subjects and company needs) and a limited research partnership between the public and private sectors. There is also limited access to international and regional scientific innovations and a lack of joint research programmes in the region. Research is generally scattered and little- published, especially within networks. There is a shortfall in research in several areas, including natural resource management, agricultural biotechnology, waste water treatment, renewable energy and climate change.

Investment in R&D represented less than 1 % of GDP in most of the countries, except in Tunisia (1.25 % of GDP) in 2009

There is a shortfall in research in several areas, including natural resource management, agricultural biotechnology, waste water treatment, renewable energy and climate change

It took a long time for the climate change issue to begin to permeate into the countries' scientific institutions. However, the interest of the various stakeholders (institutions, researchers and scientists) is markedly increasing, and this can be seen in the number of scientific events organized in the region around this subject, the creation of networks and the establishment of research programmes within the research apparatus in some countries.

Some years, the North African countries set up mechanisms to boost innovation through (i) the upgrading of

industries;, (ii) the adoption of incentives to promote R&D; and (iii) the creation of institutions exclusively dedicated to the promotion of technological innovation (research centres, technology parks).

In Morocco, the National Meteorological Research Centre (within DMN) is carrying out research programmes in the areas of forecasting, atmospheric research and climate change. The Centre cooperates with several meteorological services in Europe and Africa and shares its experience at the regional level. It plans to carry out regional and local sectoral impact studies as inputs into the next IPCC assessment report.

In Tunisia, the Tunis International Environmental Technologies Centre, in cooperation with research centres and national and international universities, has set up a programme designed to identify environmental solutions suited to Tunisia. Organic waste recovery, conservation and optimal use of water resources and the transfer of environmental technologies are the centre's main areas of activity in this field.

Mention should be made of efforts to strengthen links between the productive sector and research through the development of technology parks offering an arena for partnerships between innovative companies, research centres and training organisations. An example is the technology park of Borj- Cédria (Tunisia), which specializes in biotechnology and renewable energy.

Efforts should be made to strengthen the links between the productive sector and research through the development of technology parks offering an arena for partnerships between innovative companies, research centres and training organizations

Algeria, Morocco and Tunisia have created national centres for clean production technologies, and numerous networks and research groups are working on climate, such as the Climate and Environment Research Association in Algeria or the Tunisian Climate Change and Sustainable Development Association.

The African Regional Centre of Space Sciences and Technologies in Morocco organizes postgraduate training sessions in the area of space technologies. This training leads to a Master in Space Sciences and Technologies, with a specialization in satellite-based meteorology and global climate.■

Capacity-building
Needs remain substantial

Efforts to combat climate change encounter obstacles arising principally from: (i) inadequate financial resources; (ii) limited institutional capacity and coordination; (iii) insufficient technical and scientific expertise; (iv) a failure to integrate research and development activities; (v) a poorly enforced regulatory framework which needs adjustment; (vi) poor involvement by the private sector; and (viii) limited regional cooperation.

Lack of finance, a key difficulty

Mitigation and adaptation policies require investment, technologies and binding measures in the field of natural resources management that are very costly. According to the most recent IPCC report (2007), the cost of climate adaptation in Africa could amount to between 5 and 10 per cent of the continent's GDP. But the financing mechanisms developed under the Climate Change Convention and the Kyoto Protocol do not provide sufficient resources (since the developed countries, historically accountable for greenhouse gas emissions, have not fulfilled their commitments in the Kyoto Protocol) and are difficult to access (procedures are complex, national mobilization capacities are limited). The Copenhagen agreement confirmed the priority needs of Africa in terms of funding for adaptation, but the promised resources have still not been released. The creation of the Green Climate Fund, confirmed at the Cancun Summit, should speed up fund-raising.

The countries of the region have been unable to make full use of the Kyoto Protocol's Clean Development Mechanism, which was supposed to facilitate the transfer of resources from industrialized countries to developing countries. Official Development Assistance and soft loans directly earmarked for climate change adaptation remain limited. At the same time, the proliferation of funds (outside the UNFCCC process) that are being set up at the global and regional level to support activities to combat climate change (World Bank, African Development Bank, French Development Agency, etc.) are not conducive to efforts to integrate climate and development, because of their unpredictable nature.

If countries are to be able to make full use of existing and future funding and join global markets in carbon, it is essential to strengthen their technical

and management capacities. In addition, countries will have to make efforts to (i) ensure the rational, integrated and better targeted management of public funds; (ii) release new internal resources (taxation system, mobilization of the national private sector and the financial sector, public-private partnerships, etc.); and (iii) strengthen regional integration.

Policy coordination and dialogue among stakeholders are still inadequate

On the institutional level, countries have created specific structures and mechanisms for the management of issues related to climate change (national agencies, national committees, cells, focal points, etc.), but leadership and cross-sectoral coordination must be strengthened to avoid the predominant sectoral compartmentalization and integrate multidisciplinary links in the design of strategies and programmes (for example, the integration of energy policies with other sectors).

Moreover, the participation of key stakeholders in the definition of climate policies and the implementation of adaptation options must absolutely be broadened to include research institutions (research must be organized in a consistent manner in the light of needs), the private sector and local authorities. Local authorities have an important role to play in the provision of useful data on local climate, the introduction of new technologies and conservation practices, experience-sharing and investment options.

Greater attention must be paid to the need to take locally developed adaptation strategies into account in the planning approach.

Knowledge on climate needs to be improved

Knowledge of the region's climate is still very limited. Available information comes from simulations based on the global models used by IPCC (2007), some studies on the Mediterranean and work carried out by some countries in the region. However, it must be acknowledged that global climate models do not allow for accurate interpretation at the regional or local scale owing to the lack of historical data and the failure to integrate in the global models variables such as plant cover and sand dynamics which have a major influence on the variability of African climates. The lack of regional models of climate change at relevant scales stands in the way of analysis of the impacts of climate change .

Shortcomings in terms of the availability and quality of climate databases constitute a major constraint on the design of climate risk management

and adaptation strategies. Infrastructure as well as climate analysis and modelling capacities remain limited. The World Meteorological Organisation (WMO) has again recently drawn attention to inadequate meteorological services and observation networks, which are essential tools to anticipate the effects of climate change. However, there have been improvements in several countries that have expanded their climate monitoring and forecasting capacities: Tunisia, Morocco and Algeria. Current knowledge in terms of vulnerability and the potential impacts of climate change on key sectors such as health, the economy, tourism and the coastline and on ecosystems suffers from major gaps that need to be filled.

Technical and scientific capacities are limited

As in the rest of Africa, the limited technological capabilities of the countries in the region hindered the resilience of some sectors. This is the case for agriculture, whose vulnerability has remained high, in part because of the scant technological progress achieved and the limited use of drought risk management instruments, despite a wide range of innovative approaches and technologies which have been developed at the regional level but which have received very inadequate funding. Countries have invested little in research and development, and the regulatory framework is not conducive to private investment in this area. Few research programmes are specifically dedicated to the climate change issue within universities and research centres.

Research must be endorsed through increased government funding and partnership with the private sector

Although the scientific potential is definitely growing in the countries of the region, the ability to network skills in the area of climate and its applications is limited and does not permit scientific and technological transfers within the region. To ensure the effective transfer of technology, the countries should develop partnerships with the private sector and with national, regional and international research centres. The decision of the Cancun Summit to set up a climate technology centre represents an opportunity in that regard.

The countries have benefited to various degrees from several capacity-building projects supported by multilateral and bilateral cooperation agencies. However, the approaches developed as a part of this support are

not always integrated at the national level to build institutional capacities and support long-term planning. Practical adaptation measures in the field have remained limited, and the results of these initiatives insufficiently widely disseminated.

Regional action: an approach lacking coordination and visibility

At the regional level, many climate change initiatives have been taken in recent years because of the scale of this phenomenon. These initiatives come either from existing institutions that have incorporated the climate issue in their activities, or from new networks working specifically on this issue. Their purpose is to strengthen the ability of countries to respond appropriately to the concerns raised by climate disturbances, and they are related to a whole set of areas ranging from knowledge-building (proliferation of information and exchange platforms and networks, prospective and strategic studies, evaluations, pilot activities, etc.) to the design of adaptation strategies and the implementation of adaptation programmes and projects.

Among the activities and projects carried out in Africa, very few have specifically focused on the North African region. Data and analyses remain generally at the global level, and some issues that may become critical for North Africa have been insufficiently studied, such as the issue of migrations or urbanization.

Many approaches and tools have also been created under various national and regional capacity-building projects and programmes, but they have not been widely disseminated or used. These gaps point to the importance of strengthening consistency and coordination among these initiatives as well as the need to promote more efficient mechanisms for sharing best practices and cooperation, which remain limited. For the moment, the region has drawn little benefit from the opportunities offered by current organisations and networks in gaining access to knowledge and best practices related to climate change. In that regard, it must be emphasized that the major achievements (approaches, methodologies, technologies) in efforts to combat desertification and soil degradation combat need to be built on within the context of adaptation to climate change.

Additionally, some development projects and programmes, even if they are not specifically designed in response to climate change, have recorded successful experience that might guide the choice of adaptation options: projects to combat desertification, for natural resource and

ecosystem management, for integrated development, and so on.

Promoting the sharing of best practices and operationalizing regional cooperation

Climate change is a global and multidimensional issue involving joint efforts and cooperation commensurate with the challenges. Regional cooperation can unquestionably play a major role in promoting the exchange of experience and best practices as well as technology transfer, identifying joint solutions and creating synergies, coordinating and streamlining efforts and making full use of the opportunities offered by the different regional initiatives.

Several regional meetings (such as the 5+5 dialogue) and ministerial forums have brought out the need to strengthen regional cooperation in combating climate change and to support efforts to address the essential role of agriculture in reducing carbon emissions. This should be included in international negotiating processes on climate.

Yet the scope for cooperation offered through regional centres of excellence such as the Arab Centre for the Study of Arid Zones and Dry Lands or the Regional Centre for Renewable Energy and Energy Efficiency has not been sufficiently exploited.

Regional cooperation should be increased within the framework of programmes of common interest (water resources management, renewable energy, regional climate modelling), in research (joint research platforms) and network development.

In North Africa, the Arab Maghreb Union attaches particular importance to the climate issue owing to the scale of the challenges and the great vulnerability of the region. It has initiated the updating of its subregional programme to combat desertification adopted in 1999 in order to embrace issues related to climate and biodiversity. The Maghreb Permanent Committee on Desertification and Sustainable Development is also working on a Maghreb climate change adaptation strategy, as recommended by the Union's ministerial commission on food security in 2009. The preparation of a Maghreb strategy for the development of renewable energy and the creation of a regional market for electricity as well as the design of a Maghreb water strategy and plan of action are also at the heart of the Union's concerns. All these actions are consistent with the spirit and principles of the Maghreb Charter for the Environment[30] adopted by the countries of the Union.

[30]-The Maghreb Charter for the Environment and Sustainable Development was adopted in Nouakchott in November 1992.

The League of Arab States has adopted an Arab Ministerial Declaration on Climate Change (2007), but cooperation machinery for the implementation of adaptation and mitigation initiatives have not yet been established. To back up this declaration, UNDP launched the Arab Climate Resilience Initiative in 2010 in order to help Arab countries to devise an integrated response to climate challenges and foster partnerships in the region.

The priority nature of food security and the water issue where Arab joint action is concerned was further underlined by the most recent economic and social summit (Egypt, 2011), which acknowledged the importance of drawing on the experience of leading Arab countries in terms of the joint exploitation of ground water reserves, following the example of the Libyan Arab Jamahiriya, Algeria, Tunisia, the Syrian Arab Republic and Lebanon. The summit also decided to revise the Arab region's water security strategy in order to take into account future challenges and the requirements of sustainable development.

Operationalizing international partnership

Climate change is a global and multidimensional issue involving joint efforts and cooperation commensurate with the challenges. The countries of the Maghreb are actively participating in the implementation of the United Nations Framework Convention on Climate Change. The meeting of COP 7 in Marrakech in 2001 and the role played by Algeria in leading the African group between 2008 and 2010 are proof of the active involvement of the countries in the international negotiating process on climate. Although, to date, no common position has been defined by the countries of the Maghreb, consultations began during the third meeting of the permanent committee on desertification, environment and sustainable development during which the Maghreb countries clearly declared their willingness to adopt a preventive policy and adaptation plans.

The participation of countries of the region in the Intergovernmental Panel of Experts on Climate Change, created in 1988, remains hesitant. Very few experts have joined the Panel.

At a more global level, the areas of strategic partnership with the European Union could broaden and contribute to technology transfer, in particular through FDI flows. Interesting initiatives already exist, such as those aiming to harness the considerable renewable energy potential in the region (examples: Mediterranean Solar Plan, DESERTEC and TRANSGREEN initiatives).■

Sustainable development

The green economy, a strategic orientation

The green economy is an economic system that internalizes the cost of degradation of ecosystems, which constitute the foundation of social and economic development. The challenge of the green economy is to improve growth and development without increasing the ecological footprint.

The "over-development" characterized by excessive consumption and non-sustainable production processes (depletion of natural resources, environmental degradation, climate change) is clearly seen to be a key factor in the ecological crisis.

Combating the degradation of natural resources and climate change while meeting growing development needs, in particular in the fields of energy, food and industry, requires the development of a new growth model, based on a reorientation of economic activity towards a low-carbon model which is sparing of natural resources and has a low environmental impact. The task is to stimulate the creation of new sectors, through appropriate reforms, while highlighting the economic and social value of environmental goods and services.

This approach, which is fully in line with the principles of sustainable development, offers new prospects for development and job creation. The 2008 report of UNEP and the International Labour Organisation entitled Green Jobs highlighted the opportunities and challenges associated with greener job creation. This report shows that several million green jobs have already been created in industrialized, emerging and developing countries, particularly in the sector of renewable energy and energy efficiency. Within this context, the countries of the region have real opportunities to use their natural comparative advantages (a large potential in renewable energy: solar, wind, biomass).

Restructuring the labor market and reforming education policies are among the leveraging core actions

Throughout the world, leaders have become aware of the fact that green growth is not simply one of the possible options but an imperative to restimulate their economies and create jobs. The global market for environment-related products and services is steadily increasing. Half of this market involves renewable energy and

energy efficiency, and the other half activities linked to sustainable transport, water management and sanitation and waste management.

Initiatives in favour of clean and efficient development grow in number

Environmental degradation remains a major concern in the countries of the region, and the pressures on the environment stemming from socio-economic activities will grow with climate change. According to a report by the Arab League, the cost of environmental degradation is estimated at between 2.4 and 4.8 per cent of GDP in the Arab countries, while the share of GDP allocated annually to the environmental preservation remains insufficient in most of the countries, except in Tunisia, where it stands at 1.2 per cent of GDP (in Morocco, this share is no more than 0.7 per cent).

Aware of the close links between environmental and economic problems, most of the countries in the region attach key importance to addressing the goals and principles of sustainable development[31] in their policies and programmes. The 2010 Environmental Performance Index reflects the significant efforts made by the countries of the region in the implementation of environmental policy. Tunisia is ranked 74th out of 163 countries (fifth in Africa, followed by Algeria, Morocco and Egypt in second, third and fourth place).

Faced with the economic and financial crisis and climate change, these commitments have been strengthened to promote a transition to a green economy which would open up new perspectives in terms of sustainable growth, employment and skill development.

Nearly all economic and social activities generate greenhouse gas emissions and so reducing these emissions offers considerable potential for introducing new environmentally friendly practices and technologies which can create new jobs. There are also opportunities for the region to develop and/or strengthen new niches (organic agriculture, biofuels, sustainable forest management, energy recovery from organic waste, ecotourism). The still underexploited options of

[31]-The principles of sustainable development are defined in Agenda 21, adopted in Rio (1992), and the Plan of Action adopted at the Johannesburg World Summit on Sustainable Development (2002) (www.un.org/esa/sustdev/agenda21.tm).

[32]- The EPI assesses the efficiency of environmental policies using 25 criteria (University of Yale and Columbia).

improving energy efficiency and CO2 capture and storage (in particular through agriculture) should be given priority, bearing in mind their economic and environmental advantages

In view of the fact that reducing unemployment is a major challenge for the region (according to ILO's 2010 report, the overall unemployment rate in North Africa was 10.5 per cent in 2009 and is likely to reach 10.6 per cent in 2010), the growing interest of the countries in effecting this conversion can easily be understood.

The scale of the reforms (political, institutional, regulatory and financial) accomplished in recent years in most of the countries in order to promote the development of renewable energy and energy efficiency confirms the growing awareness of the economic, social and environmental issues associated with these sectors and the resolve to fully exploit the potential for growth and job creation they contain.

Dialogue has been initiated among the main stakeholders in development (government, private sector, research centres, local authorities), and measures designed to support/strengthen the development of green sectors (organic agriculture, waste water utilisation, sea water desalination using solar energy, waste recovery and electricity generation, wind and solar energy development, sustainable development, ecotourism, etc.) are continuing.

Greater efforts in research and development will be needed to ensure the deployment of eco-innovations

The upgrading of the industrial fabric to improve its eco-efficiency and competitiveness has significantly progressed in recent years. Even in the absence of genuine incentives, industries have taken action to achieve energy savings and reduce their emissions: the use of carbon budgets is growing. There is also progress in the creation of green businesses.

In Morocco and Tunisia, the development of ecotourism is already seen as a real opportunity to improve the growth of a key economic sector through the adoption of renewable energy and energy efficiency. Morocco's brand new “Green town” project is an outstanding initiative. By relying on energy management and renewable energy use, sustainable water management and energy recovery from waste, the project aims to secure international certification (LEED ND).

Tunisia is to launch a comprehensive study on the green economy and clean production in order to devise economic and financial guidelines and identify investment opportunities in the environmental sphere. While continuing its programme for the environmental upgrading of enterprises in order to obtain ISO 14001 international certification, Tunisia is stepping up monitoring of highly polluting companies to see to it that they comply with the country's environmental standards. The Tunis International Environmental Technologies Centre is working on technical and ecological standards to govern the granting of the Tunisian green label to some food products. It is also working on support programmes for businesses and studies required in order to promote the Tunisian green label internationally,, through an application for membership of the international network of green labels, in collaboration with the National Standardization and Intellectual Property Institute and in partnership with the Export Promotion Centre.

Egypt has launched a study to identify the existing potential and integrate the green economy into all sectors (under UNEP's Green Economy initiative). It places emphasis on urban transport and clean industries and is launching a project to turn the city of Sharm El-Sheikh into a green city in 2020.

Algeria is encouraging clean modes of transport through the use of less polluting fuels (such as LPG) and is launching a programme called “New low-carbon green cities” with a target date of 2025. This programme combines the use of renewable energy, energy efficiency, clean transport, zero-carbon buildings and a centre of excellence for technology transfer.

The opportunities offered by sustainable agriculture (stimulation of exports, job creation, enhanced incomes) are reflected in the growing importance of organic agriculture in the agricultural sector in some countries and the attention given to some strategic fields, despite major challenges.

However, the transition towards a green economy, sparing of carbon and more environmentally friendly, will call for the introduction of supportive policies and an adjustment of economic and regulatory instruments to reorientate modes of production and consumption and encourage innovation and the dissemination of clean technologies as well as the sustainable use of natural resources. A restructuring of industrial activity and employment will be necessary. This will also entail large-scale investment in the restoration of ecosystems and the sustainable management of the environment and natural resources.■

Some food for thought

In order to create the environment necessary for environmentally friendly growth, serious thought will need to be given to the following key issues:

1. Reform of government policies

• Integrate the green economy in development policies and achievement •of the MDGs (on the basis of clearly defined goals)
• Adapt or revise industrial policies and identify strategic industries in terms of growth and employment
• Promote interactions between research and development policies
• Initiate agrarian and urban reforms.

2. Strengthening and adaptation of the regulatory framework

• Adapt and harmonize the existing regulatory frameworks (for example, amend the town planning code, introduce new regulations concerning heating in the construction sector)
• Adopt and enforce environmental standards by sector (urban management, building codes, etc.).

3. Supporting measures

• Define the key measures related to the labour market and vocational training which are aimed at promoting the redeployment of the workforce in greener activities and skill development
• Develop the qualifications and skills of the workforce so that they respond better to the rapid evolution of demand
• Build the capacities of key stakeholders (governments, banks, private operators, local authorities) in green business, CDM and carbon finance
• Help SMEs (upgrading, access to financing, incentives)
o Create positive incentives for the introduction of sound environmental

practices and the development of clean technology

• Launch programmes of environmental education and civic awareness to change behaviour in favour of the rational management of natural resources

• Strengthen cooperation between industries and research centres.

4. Economic instruments

• Launch a reform of subsidies that are harmful for the environment, in particular those promoting the use of fossil fuels

• Introduce proper pricing of environmental goods and services

• Promote measures conducive to greener production and consumption: green taxes, tax incentives, certificates, etc.).

5. Financial mechanisms

• Raise internal resources (environmental tax reforms) and create green investment funds

• Promote use of the Clean Development Mechanism

• Promote the involvement of the banking sector in supporting projects

• Promote public-private partnerships

• Promote public and private investment in research and development related to the environment.

6. Strengthening of cooperation

• Enhance existing cooperation frameworks and networks in the area of sustainable development

• Identify and secure funding for best practices in sustainable natural resource management and environmental protection

• Evaluate the global partnership instituted within the context of the World Summit on Sustainable Development and identify obstacles

• Strengthen regional and international partnerships to promote technology transfer: reduce barriers to trade and the mobility of skilled workers.■

List of acronyms and abbreviations

ACPC	African Climate Policy Centre
CDM	Clean Development Mechanism
ClimDev-Africa	Climate for Development in Africa Programme
COP	Conference of the Parties to UNFCCC
ECA	Economic Commission for Africa
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
MDG	Millennium Development Goal
OECD	Organisation for Economic Co-operation and Development
SSO	Sahara and Sahel Observatory
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organisation
WMO	World Meteorological Organisation

Bibliography

Barbier E. B.	A global green new deal, 2009
Bigio G.	A. Vulnerability to climate change of coastal cities of North Africa February 2009
WB	Global Economic Prospects, World Bank 2010 World Development Report Development and climate change, 2010 Economics of adaptation to climate change, 2009
UNFCCC	Annual Report, 2007
ECA	Sustainable Development Report on Africa: Five-Year Review of the Implementation of the World Summit on Sustainable Development Outcomes in Africa (WSSD+5), 2008. Assessing Progress in Africa toward the Millennium Development Goals: MDG Report 2009
ECA-NA	Sustainable development in North Africa: state of play and prospects, 2007 Water and Environment in North Africa: policies and strategies, 2006
ETUC	Resolution on Climate Change: new industrial policies and ways out of the crisis, European Trade Union Confederation 2009
UNCTAD	World Investment Report, 2009
FAO	Profile for Climate Change, 2009 Impact of climate change on the world state of fisheries and aquaculture, 2009
IMF	Climate change, the Global Economy and the IMF, 2009
IPCC	Climate Change 2007 Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the In tergovernmental Panel on Climate Change
IISD	Climate Change and Security in Africa, 2009
IISD	Vulnerability of North African countries to climatic change, 2009

IPCC	Fourth Assessment Report on Climate Change, 2007
MEMWE	Plan National contre le réchauffement climatique, PNRC (Na tional Plan against Global Warming, Ministry of Energy, Mining, Water and Environment, Morocco 2009
OECD	Interim Report of the Green Growth Strategy, 2010
	Costs of inaction on key environmental challenges, 2008
	The economics of climate change mitigation: how to build the necessary global action in a cost-effective manner 2009
	OECD Environmental Outlook to 2030, 2008
	Climate Change Mitigation: What do we do? 2008
WHO	Global health risks: mortality and burden of disease attributable to selected major risks, 2009
UN	World Economic and Social Survey: Promoting development, saving the planet, 2009
SSO	Institutional Mapping of Adaptation in North Africa, 2007
UNDP	Climate change and consequences on development, 2010 (UNDP/UNFPA/UNICEF/WPF)
UNEP	Global Trends in Sustainable Energy Investment, 2009
	New Global Green Deal: Policy Brief, 2009
	Climate change as a Security Risk, 2007
	Blue Plan: Climate Change and Energy in the Mediterranean, 2008
UNEP/ILO	Green jobs: Towards decent work in a sustainable, low carbon world, 2008
UNEP/WTO	Report on Trade and Climate Change, 2009
Stern N.	Review on the economics of climate change, 2006
UNDESA	World Economic and Social Survey: Promoting development, saving the planet, 2009
	Climate Change Adaptation Strategies in Tunisia
UNFCCC	Climate change: impacts, vulnerabilities and adaptation in developing countries, 2007
WWEA	World Wind Energy Report 2009, World Wind Energy Association, 2010

Some useful links:

REME- Réseau des Entreprises Maghrébines pour l'Environnement (Network of Maghreb Companies for Environment): www.reme.info
Réseau arabe des experts en eau (Arab Water Experts Network): www.ResEau-Arabe.net
CITET- Centre International des Technologies de l'Environnement de Tunis (Tunis International Centre for Environmental Technologies): www.citet.nat.tn
CRTEN- Centre des Recherches et des Technologies de l'Energie de Tunisie (Tunisia Energy Research and Technology Centre): www.crten.rnrt.tn/

CEDARE- Centre for Environment and Development for the Arab Region and Europe: www.cedare.int

ARCE- Association de recherche sur le climat et l'environnement de l'Algérie (Algeria Climate and Environment Research Association): www.arce.asso.dz/

Laboratoire Réseau de Surveillance Environnementale (Environmental Watch Network Laboratory)- Oran University– Algeria: www.lrse-univo-ran.com/

CIHEAM- International Centre for Advanced Mediterranean Agronomic Studies: www.ciheam.org
UN-Water/Africa: www.uneca.org/awich
Intergovernmental Panel on Climate Change (IPCC): www.ipcc.ch
Department of Environment, Ministry of Land Planning, Urban Planning, Habitat and Environment, Morocco: www.minenv.gov.ma
Centre d'information sur l'Energie durable et l'Environnement (Information Centre on Sustainable Energy and Environment), Morocco: www.ciede.org.ma
Ministry of Environment and Sustainable Development, Tunisia: www.changementsclimatiques.tn
Delegate Ministry to the Prime Minister in charge of Environment and Sustainable Development, Mauritania: www.environnement.gov.mr
Egyptian Environmental Affairs Agency: www.eeaa.gov.eg
Libyan Climate Change Group: http://lccg.ly/en/about.php

Sustainable development and climate change:

How North Africa is positioning itself ?

North Africa is one of the most vulnerable regions to climate change. It could be among the areas worst affected in terms of food security, sustainable water supply and extreme climate events such as floods, droughts and desertification, which, above and beyond their social impacts, will destroy the already inadequate infrastructure.

The countries of the region, aware of the risks related to climate change- but also the benefits in terms of growth and jobs which they could draw from appropriate modification of their economies and exploitation of the natural resources potential- are firmly committed to integrating this issue into their development policies. They have drawn up national strategies, launched mitigation programmes and placed emphasis on the adaptation of key sectors and the development of clean technologies.

Current experience proves that the region has the potential to stimulate the emergence of new sectors which embrace environmental requirements, and to play a competitive role in the global economy, provided that workforce productivity, technology and innovation are improved.

Despite the progress made and the potentialities available, the scale of the challenges which the region could face will require the strengthening of their institutional and technical capabilities and the mobilization of additional resources. The introduction of innovative financial mechanisms and the building of partnerships have recently progressed in a positive way in the region, but they will have to be strongly supported through international and regional cooperation. Thus, in the same way as Africa, the region is striving in many ways to ensure that its concerns and needs are taken into account in the negotiations for a post-2012 agreement. Accordingly, it seeks better access to existing or future instruments within the global partnership to combat climate change (CDM, Green Climate Fund, REDD-plus, climate technology centres).

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