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Background paper on:

CLIMATE CHANGE IMPACTS AND ADAPTATION IN MOUNTAIN REGIONS IN THE MENA REGION

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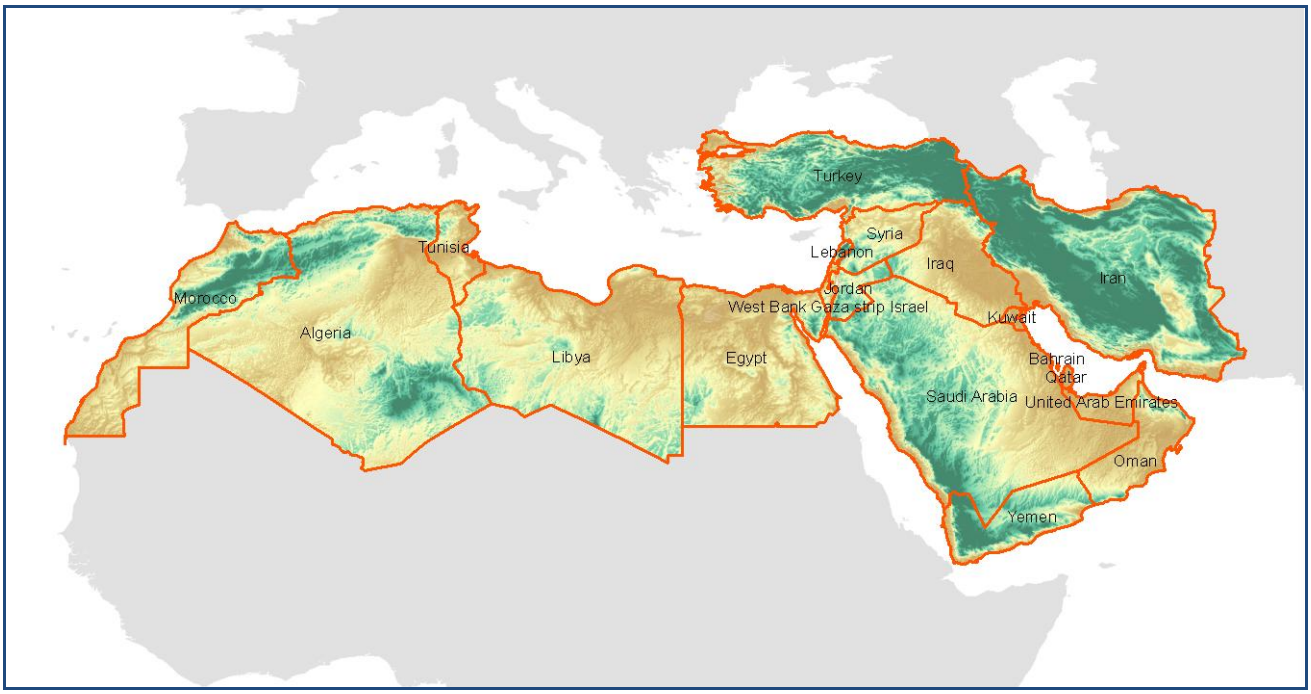

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1. INTRODUCTION

The Middle East and North Africa (MENA) region MENA includes Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Palestine, Saudi Arabia, Syria, Tunisia, Turkey, United Arab Emirates and Yemen. Major mountain environments comprise the Atlas Mountains (Morocco, Algeria and Tunisia), the Nafusa and Jabal Akhdar Mountains (Libya), Mount Sinai (Egypt), the Abarim Mountain (Jordan), the Judean hills, Golan Heights and Mount Carmel (West Bank and Israel), Mount Lebanon and Anti-Lebanon (Lebanon), the An-Nusayriyah Mountains (Syria), the Zagros and Alborz Mountains (Iraq and Iran), the Sarawat Mountains (Saudi Arabia and Yemen), Al Hajar Mountains (Oman and United Arab Emirates), and the Dhofar Mountains (Oman). Mountains are vital for sustainable development as they significantly contribute to food security, fresh water supply, biodiversity protection, goods and key ecosystem services in many of the MENA countries. There are large differences in geographical, geological, climatological and socio-economic characteristics within the MENA mountain region, and a corresponding diversity of services and related key issues.

Worldwide, climate change will likely increase the occurrence of droughts, and resulting hydrological changes will increase water scarcity, reduce agricultural productivity and rangeland cover and productivity, and also heighten the risk of flooding in urban coastal areas and sea level rise. Also, climate change will likely increase the exposure of mountainous regions to extreme events such as storms, landslides, avalanches and rock falls. Mountain ecosystems are particularly vulnerable to climate change due to their high relief, steep slopes, shallow soils, adverse climatic conditions, and geological variability. People living in mountain regions are particularly vulnerable to climate change due to high poverty rates, poor health, high dependence on natural resources, isolation and limited livelihood diversity. While our understanding of climate change impacts on agriculture, water resources and land use is increasing, there is still a limited understanding of the social implications of climate change. Some evidence seems to suggest an increasing level of internal migration, change in population growth, and socio-economic inequalities due to climate change.

Most global and regional climate models conclude that the MENA region might be particularly affected by climate change, as the region is one of the most water-stressed in the world and as food security and ecosystems are highly dependent on an already erratic and dry climate. Services provided by mountains are under increasing pressure from human activities and climate change. Many of the issues related to climate change in the MENA mountain region are trans-boundary and common. Reducing the vulnerability of the MENA mountain region to climate change requires efficient national and regional governance, founded on reliable scientific findings, improved adaptation measures and technologies, and the involvement of local communities.

The objective of this background paper is to (1) identify the key issues, present an analysis of the state of knowledge, and identify important knowledge gaps regarding climate change impacts and climate change adaption in mountain regions of the MENA region; (2) provide a general overview on the current state of UNFCCC tools, mechanisms and main messages that could be used to address climate change mitigation and adaptation in MENA mountain regions; and (3) propose a prioritized agenda for advancing knowledge of climate change impacts and climate change adaptation in the MENA mountain regions.

2. CLIMATE CHANGE IMPACT ON THE MENA MOUNTAIN REGIONS

2.1. CLIMATE CHANGE PROJECTIONS IN THE MENA REGION

According to the IPCC's fourth assessment report as well as international papers published on climate change, the MENA region is expected to become hotter and drier. The intensity and robustness of the climate change signals produced by a range of global and regional climate models suggest that the Mediterranean might be vulnerable to climate change, especially over Morocco, Algeria and the Middle Eastern countries, with projected reduced precipitations and higher temperatures. Also, inter-annual variability is projected to generally increase, as is the occurrence of extreme heat and drought events.

North Africa is among the regions that would be most affected by climate change, particularly along the Mediterranean coast. By the end of the 21st century, annual mean temperatures are expected to increase by annual median values of 3.5 and 3.6°C, respectively, for the *A1B* scenario. These temperature increases are larger than the global annual mean warming of 2.8°C predicted for the same period by IPCC. Climate change would result in precipitation decrease of a median annual value of 12%, especially during the critical phase of the cropping season (-16%, during March-April-May) and the summer (-24%, during June-July-August).

2.2. CLIMATE CHANGE PROJECTIONS IN MENA MOUNTAIN REGIONS

Worldwide, few assessments of the impact of climate change have been conducted on mountain regions, in contrast to other systems such as agriculture, tropical rainforests, coastal zones, and high-latitude or arid areas. The last IPCC comprehensive study on the impact of climate change in mountain regions dates back to 1996. Working Group II of the coming 5th IPCC assessment report is examining all the changes in the various terrestrial and marine ecosystems of the world, including mountainous systems.

At the global scale, mountains are among the ecosystems which would be most affected by climate change. Mountain regions have experienced above-average warming in the 20th century. Predictions for the 21st century indicate that temperatures will continue to increase disproportionately in mountain areas. The rate of warming in mountain systems is projected to be two to three times higher than that recorded during the 20th century. Projected average temperature changes vary between +3.2°C (+0.4°C per decade) and +2.1°C (+0.26°C per decade) for 2055 and between +5.3°C (+0.48°C per decade) and +2.8°C for 2085 (+0.25°C per decade). The temperature is expected to rise by a greater amount in higher northern latitude mountains than in mountains located in temperate and tropical zones.

The Mediterranean mountains seem to suffer the double jeopardy of being mountains and being located near the Mediterranean basin. At the level of the Mediterranean mountains, the range of projected warming varies between +1.4°C and +5.1°C for 2055 (+1.6°C and +8.3°C for 2085), with reduction of precipitation, mainly during spring (-17% under *A1fi* and -4.8% under *B1* for 2085). In the Atlas Mountains, the warming would reach between 2.2 to 3.1°C in 2050 according to scenarios and, consequently, to a decrease in precipitation between 2.3 to 5.3% (6.3 to 8.8% during spring season).

Most of the Near East mountains will warm up between to 3 to 4°C in the worst-case scenario, with the exception of Sudan and the southern part of the Arabian Peninsula where warming will average between 2 to 3°C, and the mountains of eastern Anatolia and central Iran, which will warm up to between 4 to 5°C. In the best-case scenario, the mountains of the region will warm up between to 2 to 3°C except for Sudan and the southern part of the Arabian Peninsula, with the lower rates between 0.75 to 2°C. The projection in precipitation changes is less reliable, with considerable regional and seasonal variability between different model projections and a high degree of uncertainty.

2.3. IMPACTS OF CLIMATE CHANGE

Mountains in the MENA region are already vulnerable to many environmental and human stresses even before climate change. Various climate change impact studies have been carried out across the MENA region, leading to different results depending on the ecosystem targeted, the data, models and temporal and spatial resolution used. In the North African and Eastern Mediterranean countries, an increase in the global mean temperature by 3.5 °C, a decrease in precipitation by 12% and a frequency of extreme warm weather in 100% of cases and extreme dry weather in 46% of cases with wide seasonality variations occurring by 2080-2099 has been projected as compared to the 1980-1999 baseline, under *A1B* emission scenario. Given that the Mediterranean is a transition area between the temperate climate of central Europe and the arid climate of northern Africa, such changes have the potential to profoundly modify the climate characteristics of the Mediterranean. Expected warmer climate will reduce the amount and duration of snow cover, consequently reducing water availability, hydropower potential, and changing seasonality of flows in regions supplied by melt water from major mountain ranges. Indeed, expected reduced precipitations would affect water availability for irrigated agriculture and natural vegetation as well as water regimes, which in turn would disturb a range of socioeconomic activities. Most significant impacts of climate change in North Africa (Morocco, Algeria, Tunisia, Libya, and Egypt) will likely include: water resource stress, crop productivity decrease, migration pressures, increased frequency of floods, and reduced water services (tourism, industry, etc.). In the mountains of the Mediterranean Basin, an extinction of approximately 60% of the total plant biodiversity by 2080 is predicted. For example, in the Anti-Atlas of Morocco, climate change projections show that the pressure on water resources in the Rheraya catchment will increase, leading to greater competition for surface water, and that domestic, tourist, livestock and agricultural demands will not be met by the year 2100. Also, in the High Atlas and Middle Atlas mountains of Morocco, the intensification of the summer drought period may cause a significant reduction of the populations of a number of relic species. In the Euphrates-Tigris basin, the majority of GCM models and scenarios suggest a significant decline (between 10 and 60%) in available snow water, particularly under *A2* climate change scenario and later in the 21st century. In the Zabadani Sub-Basin of Syria, climate change will result in a decrease of 37% in annual discharge by 2039, and a restriction of spring discharges mainly at peak times (Syria's Initial National Communication, 2010). In Lebanon, expected changes in temperature and rainfall are expected to be accompanied by a significant change in bioclimatic levels, and probably a reduction in snow cover (Lebanon's Second National Communication, 2011).

2.4. UNCERTAINTIES IN FUTURE PROJECTIONS

MENA is one of the regions of the world where relatively fewer uncertainties in climate change projections are computed by both global and regional climate change models. Uncertainty in future climate change trends derives from three main sources: forcing, model response, and internal variability. Forcing uncertainty arises from incomplete knowledge of future trajectories of anthropogenic emissions of GHG, land use change, etc. Model uncertainty results from differences in physical and numerical formulations, studied geographical territories, downscaling approaches, spatial resolution, and data accuracy and availability. Internal variability is the natural variability of the climate system that occurs in the absence of external forcing. In general, Global Circulation Model predictions of temperature changes for a given region are consistent, contrarily to precipitation changes that can vary widely. The 4th IPCC assessment report addresses some of the difficulties in simulating climate change trends in mountainous regions of the world. One of the reasons is the complexity of their topography that induces rapid and systematic changes in climatic parameters, in particular temperature and precipitation, over very short distances. These changes are in general not detected by the current spatial resolution of Global Circulation Models (GCMs) and even Regional Circulation Models (RCMs), in relation to the very sparse climatic information available over these regions. Impact studies inherit the coupled uncertainty coming from climate change projections and from biophysical models (agricultural, hydrological, etc.) that are powered with these projections. The overall impact uncertainty is even more difficult to quantify when a chain of models are associated (climate change, hydrological, crop and economy), resulting in a propagation of errors.

2.5. ADAPTATION AND MITIGATION OPTIONS TO CLIMATE CHANGE

The MENA countries are highly vulnerable to the impacts of climate change, but at the same time are partly responsible for global warming, as their per capita greenhouse gas emissions are very high (60% higher than the average among developing countries). However, in absolute terms the region is a relatively small emitter, responsible for 5 to 6% of global emissions, with huge differences between oil-producing countries and others. This vulnerability to climate change is likely to exacerbate persistent development challenges. For this reason, governments of the MENA region are more concerned with adaptation than mitigation.

A number of adaptation options have been identified under national development and research programs, including in National Communications (NCs) and in National Adaptation Programmes of Action. Many of these adaptation measures could be used to generate lessons. However, most MENA governments have concentrated the bulk of their resources on large scale supply side projects such as dam construction and inter-basin water transfers (Egypt, Morocco, Lebanon, and Saudi Arabia), promoting irrigation schemes (Egypt, Morocco, Turkey), tapping fossil groundwater aquifers (Egypt, Jordan, Libya, Gulf states), desalinization (Saudi Arabia, West Bank and Israel) and importing virtual water. As mountainous regions are closely linked to forest areas, the adaptation to climate change in the MENA mountain region is mainly addressed under the perspective of deforestation (Algeria, Lebanon, Morocco) and forest fire mitigation (Morocco, Syria), improvement of watershed resilience (Algeria, Jordan, Lebanon, Morocco, Syria) and fauna and flora biodiversity protection (Lebanon, Morocco, Yemen) (see: Initial and Second NCs, submitted by the MENA countries to UNFCCC http://unfccc.int).

In arid and semi-arid areas of the MENA region, adaptation is closely linked to mitigation, as most of the measures adopted to maintain vegetation cover, improve crop yields and water use efficiency, reduce soil erosion, and stabilize populations on their lands contribute to increase carbon sequestration within soil and plants. Some improved and well-tested technologies are already used in many MENA countries, like the no-till system. This conservation agriculture system which improves crop yields, increases carbon sequestration in the soil and reduces energy costs is practiced by North African farmers in Tunisia (12,000 hectares) and Morocco (6,000 hectares).

Lebanon: Al Shouf Cedar Society (ACS, www.shoufcedar.org) was specifically created to manage the The Shouf Cedar Biosphere Reserve (SBR) which hosts one of the last strongholds of the Cedar of Lebanon. This organization promotes initiatives for improving the livelihoods of the communities living around the Reserve, and an economy based on the sustainable utilization of natural resources. ACS is promoting eco-tourism through the establishment of facilities managed by the Reserve and is also promoting services offered by small local enterprises. More than 20,000 tourists (60% Lebanese nationality and 40 % various foreign nationalities) visit the Reserve every year. The Reserve has become a major eco-tourism destination in the Middle East.

Yemen: The Agro-biodiversity and Climate Adaptation project (2010-2014) in Yemen is partly financed by the Global Environment Facility (4.0 million US$). The project aims to enhance capacity and awareness at key national agencies and at local levels, and to respond to climate variability and change through the conservation and use of agro-biodiversity. The project will encourage water harvesting and increasing irrigation efficiency as part of a climate-resilient "win-win strategy". The project will emphasize the conservation of agrobiodiversity and developing a range of coping mechanisms using predictive climate modeling.

Syria: The Government of Syria worked with IFAD, as well as with local communities, on the Badia Rangelands Development Project to reduce vulnerability to climate change and restore the long-term productivity of rangelands. The project restored three million hectares of rangelands. After two years of resting, reseeding, and planting shrubs on 1.4 million hectares, for example, birds, insects, and animals returned to the area. Higher household incomes enabled the community to offer women literacy classes and training courses in new skills such as first aid, food processing, and sewing, all of which could help further diversify incomes. More availability of grazing feed and a strong participatory approach to rangeland management also significantly increased the resilience of herder communities to severe droughts.

Jordan: The Badia Ecosystem and Livelihoods Project supports sustainable livelihoods and enhances ecosystem services through participatory approaches in selected areas of the Jordan Badia. It is financed by the GEF (3.3 million US$). The project is closely linked to the Government of Jordan's vision for the Badia, which looks at reducing poverty and unemployment, and at improving the living conditions of Badia communities; and to the National Poverty Reduction Strategy, which aims to increase employment opportunities in rural areas and secondary towns.

Morocco: The project "Integrating Climate Change in the implementation of the strategy of the Ministry of Agriculture" (called "PICCPMV") aims to strengthen the capacity of relevant stakeholders in integrating climate change adaptations in governmental agricultural projects for vulnerable people in Morocco. The project is jointly financed by the Special Climate Change Fund / Global Environment Facility (4.35 million US$) and the Moroccan government (26.9 million US$). It's an ongoing project (2011-2015) that is currently developing the capacity of relevant staff of public and private institutions involved in the planning and implementation of agricultural projects on climate change adaptations. The PICCPMV project is supporting the dissemination of climate change adaptation measures among poor farmers, by means of technologies developed by the National Institute for Agricultural Research of Morocco: drought resistant varieties, conservation agriculture, rainwater harvesting, organic agriculture, and environmentally-friendly agricultural practices.

3. IMPORTANT KNOWLEDGE GAPS REGARDING CLIMATE CHANGE IMPACTS AND CLIMATE CHANGE ADAPTION

The science of agrometeorology has made considerable efforts to capture the important features of climate in order to optimally manage crops and ecosystems depending on available natural resources. However, the increasing variability of the climate during the last decades and the expected climate change are forcing the scientific community to place food production and sustainable use of natural resources in the climatic risk perspective. The UNFCCC clearly recognizes the importance of scientific information as a foundation for action on climate change, particularly in respect to adaptation. The Parties to the Convention commit to "*promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies*."

Reducing risks related to climate variability and climate change requires making adequate technical and political decisions, based on reliable data, about the past and the future climate, at the spatial and temporal scales that are consistent with the particularities of the mountains in the MENA region. In the MENA region, there remains a large gap in the scientific capacity to analyze data, interpret results and develop models and tools that fit stakeholder's needs. In particular, there is a need for improving our knowledge of climate impacts and practical measures to reduce the exposure of mountain ecosystems to extreme events, climatic risks and disasters, change and loss of biodiversity, poverty, human displacement, social inequalities (gender, poor and young people), plant and human diseases, water scarcity, and to improve sustainable productivity of agriculture in order to ensure food security in the long term. Long-term and continued analysis of climate data base, climate variability and climate change impacts could provide critical raw materials for future impact assessments. On the other hand, while many scientific findings, methods and data are well documented and are available at very low effective costs, their implementation is still far from optimal in many countries.

Despite the fact that policy-makers are in general well aware of climate change and related impacts at both global and regional levels, their sector and specific level impacts knowledge is less clear to them. There is a need for decision-making information and tools for appropriate adaptation measures that should be implemented to cope with climate change at national and detailed scale or community levels. Also, there is a gap between the scientific community and extension workers that are in charge of transferring climate change information to stakeholders and help in implementing adaptation strategies. One of the main reasons is the lack of effective national governance in promoting the use of climate information for coping with climate change issues.

4. OVERVIEW ON THE CURRENT STATE OF UNFCCC TOOLS AND FINANCIAL MECHANISMS TO ADDRESS ADAPTATION TO CLIMATE CHANGE

Under the UNFCCC, developed countries have taken on an obligation to financially support mitigation and adaptation efforts in developing countries. All countries of the MENA region are classified as Non-Annex I countries by UNFCCC and are eligible to receive financial support. The architecture of global climate fundingis very complex. Finance is channeled through multilateral funds, bilateral channels and national climate change funds. This complexity and the proliferation of funding sources and channels are challenging for recipient countries to accessing adaptation and mitigation finance despite the urgent needs to face up to climate change.

The **Adaptation Fund** under the Kyoto Protocol was specifically initiated to assist developing country parties that are particularly vulnerable to climate change impacts in meeting the costs of adaptation, and to finance concrete adaptation projects and programmes. In April 2010, the Fund started inviting countries to submit projects and programme proposals for funding. **Payments for Environmental Services** (PES) are a financing instrument for climate change adaptation and mitigation, namely for **REDD** and **REDD+** (for forest areas) implementation. Synergies between mitigation and adaptation are high for REDD for mountain areas. Recently, a **UN-REDD** Programme emerged as a collaboration between FAO, UNEP and UNDP, and with international finance to support REDD+. The UN-REDD programme is a multi-donor trust fund that aims to help reduce global emissions from deforestation and forest degradation in developing countries. Good outcomes from a project to restore communal management systems in Iran and Morocco are encouraging the use of PES in the near future. **Water services** are still in their early stages in the MENA region, with only a few of them being currently implemented, such as the WWF (World Wildlife Fund) Mediterranean Programme in the Sebou river basin in Morocco. **Payment mechanisms for carbon sequestration** were initially established at the Kyoto Protocol's **Clean Development Mechanism**, allowing industrialized countries to set up carbon offset projects in developing countries. In the Near East region, 12 countries have submitted projects under the Clean Development Mechanism. The **Global Environmental Facility** (GEF) serves as an operating entity of the financial mechanism of the UNFCCC, with the guidance of the UNFCCC Conference of Parties, supporting adaptation plans and projects. It is the largest funder of projects to improve adaptation of communities and ecosystems in developing and in transition countries. It also operates as a financial mechanism for implementing international conventions, such as UNFCCC, CBD and UNCCD. A large share of financial resources for climate change is mobilized through the GEF Trust Fund. In addition, the GEF administers two funds under the Convention: the

Least Developed Countries Fund (LDCF) and the **Special Climate Change Fund** (SCCF). Since the Cancun COP in 2010, the design of a global **Green Climate Fund** (GCF) has been under negotiation. The GCF is a promising new fund from the perspective of developing countries with mountain systems. A growing number of bilateral climate initiatives (e.g. by Germany, the UK, Norway) pay attention to mountain systems.

The **Climate Investment Funds** (CIFs) are administered by the World Bank in partnership with regional development banks. They consist of a **Clean Technology Fund**, a **Strategic Climate Fund**, the **Forest Investment Program** (FIP), and the **Scaling-Up Renewable Energy Program** for Low Income Countries (SREP).

Several developing countries have also established national funds that receive and channel climate finance from various contributor countries. Also, a large and growing share of climate finance is spent through bilateral development institutions: ex. **International Climate Initiative** (Germany), **International Climate Fund** (UK), **International Forest Climate Initiative** (Norway), **International Forest Carbon Initiative** (Australia), **French Global Environment Facility** (France), etc.

The Climate Funds Update website (http://www.climatefundsupdate.org/) reports that climate funds coming from large varieties of financing instruments are mainly directed to mitigation projects (90.9%) while only 6.4% to support adaptation. A total of $1,017 million has been approved for the MENA region from 2003 – 2012 and for 52 projects. Most of funds have been approved to Egypt ($523 million) and Morocco ($360 million), followed by Algeria ($19 million), Yemen ($14 million) and Iran ($10 million). However, the MENA region received a small share of the climate finance for adaptation projects: Jordan ($6 million), Yemen ($5.23 million), Morocco ($4.35 million), Egypt ($4 million), and Djibouti ($2.2 million). The majority of the projects are funded at country level and only one is regional: the *Mediterranean Solar Plan and Union for the Mediterranean* initiatives (Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Syria and Tunisia), supported by Germany's cooperation. Few of the international adaptation funds are specifically dedicated to the mountainous regions, among which we can mention: the "*Project for Flood Forecasting and Warning System in the Region of High Atlas Area Action in Morocco*" and the "*Project on Adaptation to Climate Change Using Agrobiodiversity Resources in the Rainfed Highlands of Yemen*" (GEF).

5. ADDRESSING CLIMATE CHANGE IN MENA MOUNTAIN REGIONS

The Hague Conference on Agriculture, Food Security and Climate Change organized in 2010 stressed the need for institutional and policy frameworks at all levels and good governance in order to achieve adaptation to climate change, and to create an enabling environment for farming and for climate-smart agricultural investments from all sources. Coping more effectively with climate change and variability requires governance systems and policies that foster flexibility.

The capacity of countries to attract investments and to implement adaptation policies depend mainly on their overall economic status and governance, and the level of their research institutions. The role of financial services and their accessibility by rural people are also critical elements of climate risk management. Products tailored to the needs of rural people can offer innovative options to respond to climate change impacts.

There is then a need to strengthen capacities of national research & development institutions, in order to understand the probable biophysical, economic and social impacts of climate change. According to the Knowledge Assessment Methodology Data Base of the World Bank (2008), the MENA region suffers particularly from the deficit of its research and development systems. The effective spatial and temporal resolution of climate change impact assessment cannot be achieved without high level research programmes.

A regional partnership is essential in order to fill the gap regarding climate change impact assessment and climate change adaption, as many mountains cross MENA countries and as many of their vulnerabilities are transboundary and common. This partnership should include farmers' organizations, scientists with the necessary range of expertise, management and decision-makers. Strategies to cope with climate change can only be achieved with stakeholder involvement, as human activities have become important drivers of global environmental change.

Some efficient technologies and measures have been already developed to reduce the vulnerability of the ecosystems, as climate change has already happened in many of the MENA countries. Several efficient and well tested tools and approaches in the field of agrometeorology are now available in the MENA region and could be already used for climatic characterization, crop forecasting, managing climatic risks and for improving crop production through better use of water and land resources, at both country and farm levels. Also, a significant volume of knowledge about climate and agriculture is currently available worldwide. To convert this knowledge into action, it must be adapted locally and communicated to various types of users, from scientists and technicians to those involved in operational aspects of agriculture – production, storage of products, trading and similar activities. While technological innovation is an important aspect of adaptation to climate change, local practices can also inform planned adaptation. In the mountains of the MENA region, traditional knowledge is an important element of climate risk management, and could provide a basis for effective strategies. Both successful technological improvements and local practices could be already disseminated to speed up the rate of adaptation.

6. PRIORITIZED AGENDA FOR ADVANCING KNOWLEDGE OF CLIMATE CHANGE IMPACTS AND ADAPTATION IN THE MENA MOUNTAIN REGIONS

The following proposed agenda for advancing knowledge on climate change and climate adaptation in the MENA mountain region is inspired from documents published by the *Mountain Research Initiative Actions* (http://mri.scnatweb.ch/the-mri/) and by the objectives of the *High-level Taskforce for the Global Framework for Climate Services* (http://www.wmo.int/hlt-gfcs/).

The main proposed issues are:

- Strengthen the Mountain Partnership constituency in the MENA Region as a mechanism to increase awareness and promote action in support of sustainable mountain development and adaptation to Climate Change;
- Create a regional information management mechanism for collecting, processing and exchanging observations and scientific data and for using climate-related information;

- Promote the drafting of projects that target the needs of MENA countries, particularly those currently least able to provide climate services;
- Develop strategies for resource mobilization (multilateral: GEF, UN-REDD, Forest Carbon Partnership Facility, Global Energy Efficiency and Renewable Energy Fund; bilateral: many developed countries; national funds), and capacity building programmes;
- Develop an advocacy and communication strategy targeted at policy and decision makers;
- Develop consistent and comparable climate scenarios and impact assessment within and between countries in the MENA mountain region;
- Develop regional economic models, taking into account environmental, demographic, economic, and political driving forces, under different regional scenarios of climate, land use, human demography, and external forces:
- Conduct demonstrative adaptive management measures in pilot sites, based on successful "best practices" in the MENA mountain regions.

7. FURTHER READING

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