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**Economic and Social Commission for Western Asia (ESCWA)**

Expert Group Meeting Towards Assessing the Vulnerability  
of Water Resources to Climate Change in the Arab Region  
Beirut, 26-28 October 2009

**Summary**

The aim of the expert group meeting was to reach a consensus on the purpose, scope and methods to be adopted for the preparation of an Arab regional vulnerability assessment of the impact of climate change on water resources among regional stakeholders. The meeting was attended by Arab member States and representatives from United Nations and League of Arab States organizations, which have been mandated to support this collaborative initiative through various inter-governmental forums.

The meeting was organized over three days. The first day consisted of plenary sessions during which various approaches for conducting vulnerability assessments of the water sector to climate change were reviewed. Preliminary scoping of the Arab regional vulnerability assessment was carried out based on the discussions.

The second day focused on climate and hydrological modelling, downscaling approaches, scenario development as well as climate and water data availability. Working groups were convened and addressed three themes, namely the: (a) scope and scale of vulnerability assessment; (b) methodological approach, methods and scenarios; and (c) selection of indicators and baseline data sources.

On the third day, the recommendations of the working groups were presented and plenary discussions took place for the formulation of a work plan for the preparation of a regional vulnerability assessment. The discussion concluded with consensus that the joint three-year project will include four main pillars. These will focus on the: (a) collection and review of baseline information, including the development of an associated knowledge management system for regional climate and hydrological data; (b) impact analysis and vulnerability assessment, which includes model identification and downscaling to the regional level based on regional specificities; (c) awareness raising and information dissemination to produce policy-relevant materials, such as a brief on vulnerability hotspots; and (d) capacity building and institutional strengthening on a variety of topics, including climate change modelling and vulnerability assessment.

A Core Group of representatives from Arab member States and UN and LAS institutions were identified to follow-up on the meeting outcomes and to further define the way forward.

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## INTRODUCTION

1. The Economic and Social Commission for Western Asia (ESCWA) in partnership with the League of Arab States (LAS), the United Nations Environment Program/Regional Office for Western Asia (UNEP/ROWA) and the Islamic Educational, Scientific and Cultural organization (ISESCO) organized the Expert Group Meeting Towards Assessing the Vulnerability of Water Resources to Climate Change in the Arab Region from 26 to 28 October 2009 in Beirut, Lebanon. Numerous representatives from most Arab Governments and regional and international organizations participated in the expert group meeting (EGM).

2. The main objectives of the meeting were as follows:

- (a) Stocktaking and exchange of lessons learned on the assessment of vulnerability of water resources to climate change from other regions.
- (b) Review of existing models and methodologies and investigation of knowledge gaps and data availability.
- (c) Building consensus on the scope, methodological approach and associated parameters for the vulnerability assessment.
- (d) Developing a work plan to be carried out by the involved agencies based on agreed upon timelines and targets.

3. The meeting was comprised of plenary sessions and working group discussion. Chapter I of this report highlights the main conclusions and recommendations of the meeting, while Chapter II provides a summary of the discussions within each session. Chapter III presents the recommendations of the working groups, and Chapter IV summarizes the subsequent plenary discussions on the work planning. Full documentation of the meeting is available at: <http://www.escwa.un.org/divisions/teams.asp?teams=Water%20Resources&division=SDPD>

## I. CONCLUSIONS AND RECOMMENDATIONS

4. The meeting concluded with agreement that a vulnerability assessment of the impact of climate change on water resources in the Arab region would be jointly conducted by United Nations organizations and League of Arab States specialized agencies in consultation with Arab member States. The vulnerability assessment would address the impact of climate change on freshwater resources, as well as the associated socio-economic and environmental implications for the region. A work plan was developed structuring the work into four main pillars, namely, a baseline review, impact analysis and vulnerability assessment, awareness building and information dissemination, and capacity building and institutional development.

5. The following details the specific activities and recommendations for each of the four pillars.

### A. BASELINE REVIEW

6. It was agreed that there is a need to develop a clear picture of the current state of freshwater resources and climate in the Arab Region. This goal would be pursued through joint efforts that would aim to:

- (a) Collect and compile existing data sources and identify data gaps;
- (b) Identify information needs (demographics, socioeconomic parameters, etc.), information sources and indicators for assessing the adaptation capacity of the region;

- (c) Establish a system for collecting, managing and accessing regional data and baseline information, including data on historical trends and information needed to populate targeted climate and hydrological models.

#### B. IMPACT ANALYSIS AND VULNERABILITY ASSESSMENT

7. In order to conduct an impact analysis, a review of existing Global Climate Models (GCMs) needs to be conducted to identify biases and shortcomings that would influence regional results generated from downscaling GCMs to the regional level. Regional Climate Models (RCMs) would be selected for application at the level of the Arab Region that can incorporate hydrological modelling and scenario development. This in turn would provide the analytical basis for conducting the vulnerability assessment. The following are the related recommendations:

- (a) Develop a region-specific baseline “climate-as-usual” scenario that represents the impact of climate change on water resources in the Arab region;
- (b) Review and select relevant RCM and hydrological models to run at least two different models, bearing in mind technical and financial constraints and the need to provide clear and reliable forecasts of climate change specificities in the Arab Region;
- (c) Develop regional scenarios for climate change and ensure a common definition and methodology is applied;
- (d) Prepare a vulnerability assessment based on the impact analysis findings and an agreed set of vulnerability indices and indicators. Vulnerability indicators should include metrics to assess the adaptive capacity of the region and associated sub-groupings to respond to climate change impacts, as well as measures for quantitative and qualitative sensitivity analysis.

#### C. AWARENESS BUILDING AND INFORMATION DISSEMINATION

8. The participants agreed that there is a need to disseminate clear and user-friendly information about climate change and vulnerability in the region. This would be pursued through various awareness raising activities as well as tools to present simplified key messages to targeted stakeholders on the findings. The following are the related recommendations:

- (a) Develop and adopt region-specific, easy-to-understand reporting and communication tools;
- (b) Disseminate accessible and actionable information for policy-makers;
- (c) Develop formal awareness mechanism to inform various civil society stakeholders;
- (d) Formulate key messages and briefs for targeted groups about the impacts of climate change and the findings of the vulnerability assessment, which would include actionable information regarding the adaptive capacity of communities to support decision-making.

#### D. CAPACITY BUILDING AND INSTITUTIONAL DEVELOPMENT

9. The meeting emphasized the need for institutional strengthening and capacity building in knowledge management, modelling, impact analysis, and vulnerability assessment. It was proposed that focus should be given to working through existing networks on climate change to enhance capacity in these areas. This would be pursued through efforts that would seek to:

- (a) Provide on the job training opportunities for national experts and staff and assist Arab countries to use available diagnostic tools and downscaling options based on agreed approaches;

- (b) Strengthen regional mechanisms for coordination, information collection and knowledge management;
- (c) Coordinate regional activities through national climate change focal points, who would in turn coordinate with national counterparts;
- (d) Strengthen regional and national-level monitoring mechanisms on climate change.

#### E. PROJECT PHASES, RESPONSIBLE AGENCIES AND TIMELINE

10. It was agreed to implement the project jointly among UN and LAS organizations in close consultation with Arab countries. The project would be structured in four pillars based on the various recommendations detailed in sub-sections A to D above.

11. A Core Group was formed to follow-up on findings of the EGM and to contribute to the preparation of the project document. The Core Group is comprised of the following:

- League of Arab States: LAS Secretariat, ACSAD, AOAD
- United Nations: ESCWA, ISDR, UNEP/ROWA
- Member States: Expert representative from Tunisia; representative from a Gulf Country

12. The expected duration of the project would be three years, with intermediate outputs issued in support of each of the project pillars.

## II. MAIN TOPICS OF DISCUSSION

### A. REVIEW OF THE STATE OF KNOWLEDGE

13. The first presentation was delivered by the Arab Organization for Agricultural Development (AOAD) and provided a review of global and regional vulnerability assessments of the impact of climate change on water resources. The presentation highlighted vulnerability concepts and definitions, the global and regional water situation within the context of current climatic conditions, and provided climate change projections for the Arab region. An example of multi-criteria vulnerability analysis of on-farm irrigation in Egypt was also offered.

14. A national approach to vulnerability assessment was subsequently presented by an expert from Tunisia. Climate modelling results to the years 2030 and 2050 were highlighted as well as the expected climate change impacts on water resources, ecosystems and the agricultural sector as compared to baseline conditions.

15. During the discussion, it was highlighted that climate change impacts need to be identified prior to the preparation of a vulnerability assessment and that vulnerability should be assessed at the local level. The need for a systematic approach for assessing vulnerabilities was emphasized. It was also noted that it is also important to enhance the accuracy of GCMs by improving their scale resolution and reducing uncertainties associated with downscaling to the regional and national levels. The importance of conducting climate projections that reflect both the current situation and what could happen in the future in relation to vulnerability should also be considered during scenario development. It was also proposed that the vulnerability assessment exercise could lead to the development of a decision support system to assist decision-makers respond to climate change threats.

## B. VULNERABILITY ASSESSMENT METHODOLOGIES AND APPROACHES

16. UNEP/ROWA presented a review of methodological approaches to vulnerability assessment based on a compendium of methods and tools compiled by the United Nations Framework Convention on Climate Change (UNFCCC) in 2008. Definitions of vulnerability and its main three factors were explained, namely: exposure, sensitivity and adaptive capacity. The presentation also elaborated on the utility of vulnerability assessments as an analytical framework for examining the implications of different climate change scenarios for the region.

17. UNDP presented a framework methodology for assessing vulnerability of the water sector to climate change in the Arab region. The presentation included an overview of the potential climate change impacts and discussion of vulnerability. Vulnerability of the water sector to climate change was defined as a function of the sector's sensitivity and adaptive capacity to climate change. Based on this, the presentation proposed that vulnerability can be assessed in three consecutive steps through a sensitivity analysis of water sector to climate change, evaluation of the adaptive capacity of the water sector to climate change; and determination of the degree of vulnerability of water sector based on the previous two steps.

18. During the discussion the representatives of the Arab countries gave brief remarks on national climate change initiatives related to the water sector. In Bahrain, the UNFCCC national communication reports were finalized and it was recommended to include information from these reports in national vulnerability assessments proposed at the regional and sub-regional levels. In Egypt, studies were conducted on the potential impact on the Nile Delta of a rise in the level of the Mediterranean Sea, and its implications on freshwater availability and land resources. In Jordan, the Ministry of Environment undertook studies on desertification and the impact of climate change on the environment and water utilization from the Disi Aquifer. In Lebanon, efforts are underway to conduct a vulnerability assessment based on a regional climate model to support preparation of the Second National Communication report. In the United Arab Emirates, it was highlighted that the main focus of the national water strategy prepared in 2004 is to develop non-conventional water resources, such as desalination of seawater and reuse of domestic wastewater. In Palestine, socio-economic impacts and vulnerability are being assessed and strategies are under preparation in various ministries as it is expected that climate change will lead to increased desertification, water scarcity and poverty. In Saudi Arabia, there are currently many large-scale investments taking place to increase desalination capacity in view of anticipated increases in water demand and water stress. In Algeria, small dams have been built, seawater desalination projects are being launched and wastewater reuse is being targeted for strategic development through 2030. The LAS noted that the Arab Ministerial Water Council was established in 2008 and is preparing a regional water security strategy that will include measures to cope with climate change.

19. Following these interventions, a mapping of current activities being undertaken on climate change was presented by UNEP/ROWA based on responses to a survey disseminated to regional organizations, universities, research institutions, and experts active in climate change and adaptation issues in Western Asia. The survey was designed to support the launching of a Global Adaptation Network on climate change at the regional level. The objective of the network is to support adaptation processes by mobilizing available knowledge and technology, piloting adaptation options, and mainstreaming adaptation in the development plans of countries and regions.

20. During the subsequent roundtable discussion, regional organizations were invited to briefly present their activities on climate change and water. UNISDR indicated that drought and floods were identified as regional priorities and that actions to adapt to their impacts should be dealt on three levels, namely the strategic, technical and operational levels. FAO noted that there is a regional project on adaptation to climate change currently being planned by the organization. The work of the Regional

Coordination Mechanism Thematic Working Group on Climate Change (RCM/TWG-CC) was reported on by UNEP/ROWA, given that the TWG has agreed to conduct an assessment of the impact of climate change on water resources, prepare an associated methodology, and examine mitigation instruments available under the Clean Development Mechanism.

21. A preliminary scoping exercise was subsequently undertaken during which experts indicated that guidelines (e.g., manual, briefing notes, brochures, etc.) should be developed and provided to the member countries to support the preparation of sub-regional and national vulnerability assessments. The Arab regional vulnerability assessment should help in allocating additional resources and encourage countries and organizations to share data and information through a coordinated regional approach. It was proposed that hotspots need to be identified to support dissemination and increased understanding of the vulnerability assessment findings, and that these hotspots should be site-specific and identified based upon an agreed set of criteria. A balance is needed between the process followed to develop the vulnerability assessment and the end products that would satisfy the needs of countries. Data gaps in the region remain a key challenge that may hinder the vulnerability assessment. Maps and reports are essential tools required to describe climate change in the Arab region. The vulnerability of other sectors (e.g., agriculture, ecosystems, drinking water, industry, tourism, etc.) should also be assessed based on the impact of different climate and hydrologic scenarios on the water resources sector on which they depend.

#### C. REVIEW OF CLIMATE MODELS AND PARAMETERS

22. The review of GCMs for assessing the vulnerability of the water sector was presented by the WMO. The presentation focused on the climate system and modelling concepts, model evaluation and climate change simulations. A review of RCMs and their applications in the Arab region was demonstrated. The Global Framework for Climate Services including the elements of its associated Information System, were introduced as the main outcomes of the World Climate Conference-3 that was organized by the WMO in September 2009. It was concluded that a regional approach to climate model applications can provide a useful synergy with hydrologic models, and also facilitates consistency and consensus in formulating and understanding future scenarios.

23. ESCWA presented a review of climate models and parameters, including definitions, various types of multi-dimensional computer models used for climate modelling at the global and regional levels and their associated uncertainties, scenario development, and issues to consider when downscaling using nested computer models. It was noted that RCMs developed for the Arab countries should be adapted to account for the regional specificities that characterize the geography of the Arab region, such as deserts, oases and urban heat islands. Current knowledge domains need to be defined and region-specific scenarios need to be built that take into consideration these specificities.

24. During the discussion it was pointed out that some factors need to be considered in climate change modelling for the Arab region such as the relevance of scientific applications to actions on the ground, limited financial resources and human capacities, and the need to develop short-term solutions to assist decision-makers secure political support for climate change adaptation measures. The WMO also noted that it provides technical support to countries by supporting the development of regional climate centres that have four functions, namely, seasonal prediction, climate monitoring, climate watches and capacity building, and that this assistance is being provided to the Arab region.

#### D. DOWNSCALING FOR REGIONAL MODELLING AND SCENARIO BUILDING

25. The Hadley Centre delivered a presentation on assessing climate impacts using dynamic downscaling, and elaborated on the uncertainty associated with climate projections, particularly at the regional level. The PRECIS regional climate model developed by the Centre was explained, as well as a

case study applying PRECIS to make projections of climate change impacts on the water resources in the Nile River basin. The presentation concluded that results from a single model simulation are not sufficient to justify the findings of an impact analysis, and that RCMs embody same amount of uncertainty as GCMs as they are based on the same assumption, but add regional details to the model.

26. ACSAD provided a review of RCMs and their application in the region. The presentation focused on climate variability, climate change scenarios, and parameters influencing uncertainty in regional climate models. It was concluded that there is a need to develop integrated tools for the prediction of climate change impacts in the Arab region making use of existing GCMs and RCMs.

27. A case study on the Lebanese experience in downscaling using PRECIS was presented by ELARD, including climate projections that are targeted for inclusion in Lebanon's UNFCCC Second National Communication report. The model predicted minimum and maximum temperatures, precipitation, relative humidity and snow mass over a spatial scale of 25 km by 25 km based on daily, yearly and decadal temporal averages.

28. It was reiterated during the discussion that several RCMs should be developed for the Arab region in order to increase the reliability of the results. Additionally, numerous topographic features need to be added when downscaling GCMs to the regional level, and associated parameters should be incorporated based on appropriate spatial and temporal scales. It was recognized that the development and application of RCMs may be time consuming and costly, and thus sufficient financial resources should thus be made available for this purpose.

#### E. DATA AVAILABILITY, RELIABILITY AND VULNERABILITY INDICATORS

29. The state of climate data availability and reliability in the Arab region was elaborated upon by the LAS expert. The presentation focused on the urgent need to make climate data available for assessing the vulnerability of water resources in the region, the main factors influencing climate in the region, as well as that state of climate data availability and data sources in the region. A case study on the historical records of climate and hydrological data of the Nile River was presented. The paper recommended the establishment of an Arab Centre for Climate that would be responsible for developing a regional climate database and conduct climate modelling.

30. The ACSAD expert delivered a presentation on the availability of geo-information on regional land degradation and drought based on studies conducted in the Arab region. The outputs of several geographic information system (GIS) and remote sensing applications were illustrated to demonstrate their utility for analyzing climate change, land degradation and drought. It was stressed that facilitating the exchange of metrological data among Arab countries is prerequisite to facilitating research on climate change and related issues at the regional level.

31. Two presentations were given by ESCWA on socio-economic indicators and water and natural resources data availability for vulnerability assessment in the Arab region. The socio-economic vulnerability indicators developed by the Inter-Governmental Panel on Climate Change (IPCC), the Sustainable Development Indicators Framework adopted by the Arab countries, and the Millenniums Development Goals (MDGs) were presented as indicators to consider when conducting vulnerability assessments. Data collection mechanism such as the UNSD/UNEP Environment Questionnaire (2008), the ESCWA Water Questionnaire (2004), and national statistical office reports on water were identified as key sources of data on water resources in the region. It was noted that applying international standards and vetted estimation methodologies for resolving data gaps, and securing agreement on common values derived from different national data sources are approaches applied to increase data reliability.



32. The importance of considering coastal data was raised, as well as the possibility to access reliable measurements on tidal fluctuations from navigation instruments. It was noted that more attention needs to be given to water quality indicators so that analysis does not only focus on water quantity indices. This could prove particularly important for Gulf countries where desalination of seawater is the main source of freshwater, and the quality of seawater along the coast has implications for the investments and technologies need for desalinization. Data quality and reliability also influences uncertainty during climate modelling.

### **III. WORKING GROUPS**

33. At the end of the second day, experts convened in working groups to discuss and formulate recommendations on how to approach three clusters of issues related to the preparation of the vulnerability assessment, namely the: (a) scope and scale of the assessment; (b) methodological approach, methods and scenarios; and the (c) selection of indicators and baseline data sources. The recommendations and outcomes emanating from the three working groups are presented below.

#### **A. SCOPE AND SCALE OF THE VULNERABILITY ASSESSMENT**

34. This working group discussed the scope and scale of the vulnerability assessment. The main aim of the discussion was to reach a consensus on the types of water resources to be covered, socio-economic sectors to consider, time scale, and geographic coverage of the assessment.

35. Experts in this group agreed to focus the scope of the vulnerability assessment on freshwater resources. The impact of climate change on non-conventional water resources, which represent a primary water resource for some countries in the region, was also highlighted as an issue to consider in the vulnerability assessment. It was agreed that baseline conditions would first need to be identified, followed by the impact assessment based on a regional model.

36. Experts also agreed on the need to define sub-regions and geographic units for organizing the vulnerability assessment. Socio-economic sectors and ecological areas of interest should be analyzed against baselines and observations in order to forecast impacts that are due to climate change.

37. With respect to the time scale, it was agreed that a medium-term scenario of twenty years would be an appropriate period in which vulnerability should be assessed. It was agreed that this shorter time scale would better help to foster political will and support than a fifty-year time step. This would also encourage the formulation of shorter-term measures for responding to climate change challenges that nonetheless remain in accordance with longer term needs. It was also agreed that the assessment exercise should seek to identify national, sub-national and local impacts since vulnerability differs among communities, while maintaining the scope of the assessment at the Arab regional level.

#### **B. METHODOLOGICAL APPROACH, METHODS AND SCENARIOS**

38. This group discussed the methodological framework within which five modules were identified, namely, (i) collection of baseline information and model identification; (ii) identification of climate-related impact hotspots; (iii) downscaling of selected GCMs to the regional level; (iv) identification and dissemination of information on vulnerability hotspots; and (v) institutional strengthening and capacity building, including raising awareness and dissemination of results associated with the vulnerability assessment.

39. With respect to the first module related to the collection of baseline information, experts agreed that it is essential to define information needs based on the parameters required to run the regional

models, and to list these knowledge and data requirements in order to identify gaps. To do this, national data sources (e.g., desk review of available information; national UNFCCC communications, IPCC reports) need to be reviewed. Also, capacity building on WMO climate software and databases, such as the Expert Team on Climate Change Detection and Indices (ETCCDI), which generates 23 climate indices using station-level data and the Standard Climatology Data Range of 1961-1990, was recommended. The work in this module would also include the collection of water baseline information, socio-economic and vulnerability baseline information and identification of the regional climate models and hydrological modelling tools to be applied.

40. The second module related to the identification of impact hotspots would deal with the collection of baseline information and trend analysis to characterize impacts. The outcome would be the preparation of a policy note on impact hotspots with a focus of the impacts of climate change on water resources sector.

41. The third module would cover the downscaling of the GCMs to the regional level. It was emphasized that two or more climate models should be run and adopted to take into account the regional specificities, bearing in mind that each RCM would take 6-18 months to process the information once collected and incorporated into the model. The importance of considering extreme events through parameters and selected models was highlighted. The linkage between climate modelling and hydrological modelling tools, such as the Water Evaluation and Planning system (WEAP), is needed to simulate the river inflows and surface runoff based on the climate model results. The projected information needs to be disseminated to all beneficiaries using effective tools and instruments.

42. In the fourth module focusing on the identification and dissemination of vulnerability hotspots and high risk areas would be identified based on the model results. Policy-oriented papers would be prepared to assist decision makers in the water sector to appropriately adapt to climate change impacts. The information of the vulnerability hotspots would be disseminated to public and private sector stakeholders in the Arab region.

43. The fifth module on institutional strengthening and capacity building seeks to build national and regional capacity in climate modelling and vulnerability assessment. This would include providing training and technical assistance in regional climate modelling, linking hydrological models to RCMs, and establishing a regional climate outlook forum for the Arab region. This forum could assist in establishing a network for forecasting seasonal climate impacts on the water sector. Capacity building programmes and training on WMO software for collecting and processing climate data on the regional level would contribute to the work of the forum.

#### C. SELECTION OF INDICATORS AND BASELINE DATA SOURCES

44. The group discussed the selection of indicators included in the Sustainable Development Indicator Framework developed by ESCWA, LAS and UNEP/ROWA in 2007 and adopted by Arab member states. The indicators focus on various themes including poverty, governance, health, education, demographics, peace and security, atmosphere, agricultural land, coastal and marine environment, water, biodiversity, economic development, as well as global partnerships, consumption and production patterns.

45. For the poverty indicators, no additional indicators were proposed. It was recommended to add 'adequate access' to the indicators related to improved sanitation, safe drinking water, and electricity, or to add commercial energy indicators. For governance, it was suggested to include sub-indices for qualifying what constitutes 'good governance,' such as effectiveness, accountability and accessibility of government institutions and policies. It was agreed that the health status and risk indicator associated

with 'smoking prevalence' would need to be removed, while other waterborne diseases should be added, such as malaria and HIV/AIDS.

46. Indicators used to describe gender, population density, indigenous groups, ethnicity and age distributions would need to be included under the demographics theme. There is a need to consider a sub-theme on 'conflict resolution' to assess impacts related to water access, water rights and implications for agreements on shared water resources. For agriculture, it was suggested to add an indicator on the types of fertilizers being used. Oil spills and wastewater management indicators should be added to the marine pollution theme. Water quality, aridity (e.g., incidence, scale and trends), flash floods (incidence, scale, trends, etc.) and critical infrastructure for water management (e.g., irrigation, power, dams, etc.) would also need to be included under the water theme.

47. No additional indicators were suggested for addition to themes related to education, biodiversity, economic development, global partnership and consumption and production Patterns themes. However, it was proposed that the atmosphere indicators would need to be deleted from the climate change list of vulnerability indicators.

48. Indicators for assessing public awareness would need to be considered, such as measures related to media outreach and infrastructure (e.g., radio, television sets owned per households, newspaper circulation, etc.); civil society involvement (e.g., in training activities, awareness messages, participatory decision-making, etc.); and private sector engagement (e.g., in support of corporate social responsibility).

49. Sources of data should also include the Emergency Events Database of the Centre for Research on the Epidemiology of Disasters (CRED), the WMO climate database, regional databases and information accessible through national disaster loss inventories and observatories.

50. It was noted that a single set of indicators cannot be generalized for all countries and it was proposed to develop various sets of indicators to consider region-specific concerns, such as river levels and flows, lake levels and reservoir storage, sea level, groundwater levels, data on nationally generated water resources vis-à-vis shared water resources, sediment concentrations and river loads, glaciations and coastal erosion.

#### **IV. PLENARY DISCUSSION ON WORK PLANNING**

51. A work plan was developed during the plenary session. The plan is organized into four activity pillars consisting of a baseline review, impact assessment, awareness building and information dissemination and capacity building and institutional development. The specific activities and recommendations in relation to the implementation of this joint project among UN and LAS organizations and the Arab member states are detailed in paragraphs 6 to 9 of this report. The project phases, responsible agencies and timeline are presented in paragraphs 10 to 12.

52. It was agreed that in order to implement the specified activities, available information and studies should be gathered, such as the Tunisia and Lebanon case studies and the UNFCCC national communication reports of Arab countries. Focal points should be identified in each country to ensure full coordination and integration among key stakeholders during the various project phases.

53. The national climate change committees and steering committees established in the Arab countries should be invited to actively contribute to this joint project. International organizations such as the WMO and the Hadley Centre, as well as several regional organizations expressed their commitment to participate and support the implementation of project activities. It was agreed that the capacity building and institutional development pillar needs to be implemented concurrently with other project activities.

## **V. ORGANIZATION OF WORK**

### **A. VENUE AND DATE**

54. The meeting “Towards Assessing the Vulnerability of Water Resources to Climate Change in the Arab Region” was held from 26 to 28 October 2009 at the United Nations House in Beirut, Lebanon.

### **B. OPENING**

55. The meeting was formally opened by Mr. Youssef Nusseir, Director of the Information and Communication Technology Division at ESCWA, who presented the opening statement on behalf of Mr. Bader Omar AlDafa, Executive Secretary of ESCWA, and by Mr. Djamel-Eddine Djaballah, Deputy Director of the Sustainable Development, Environment and Housing Division at the League of Arab States. Opening statements were also delivered by Mr. Abdul-Majeid Haddad from the United Nations Environment Programme/Regional Office for West Asia (UNEP/ROWA) and Mr. Hatem Mekhemer from the Islamic Educational, Scientific and Cultural Organization (ISESCO).

### **C. PARTICIPANTS**

56. The Meeting was attended by 35 participants, including government representatives from ministries responsible for examining the linkages between climate change and water resources from twelve Arab countries, ten of which are also ESCWA member states. In addition, water resource experts and climate change scientists from regional and international organizations and UN agencies contributed to the proceedings. The list of participants is provided in annex I of this report.

### **D. AGENDA**

57. Presentations and discussions were conducted over eleven sessions. The meeting agenda is summarized below:

1. Opening session.
2. Presentation on the state of knowledge on vulnerability assessment of the water sector to climate change and Arab country presentations by delegated Government representatives.
3. Presentation and discussion on vulnerability assessment methodologies and approaches.
4. Roundtable discussion on climate change scoping of the vulnerability assessment in the region
5. Presentation and discussion on climate models and parameters for informing water-related vulnerability assessment
6. Presentation and discussion on downscaling of regional modelling and scenario building
7. Presentation and discussion on data availability, reliability and vulnerability indicators
8. Formulation of Working Groups
9. Plenary discussion and consensus building on working group topics
10. Working Groups: Plenary discussion on work planning and identifying roles and responsibilities
11. Recommendations and closing session.

## E. EVALUATION

58. An evaluation questionnaire was distributed in order to assess the relevance, effectiveness and impact of the meeting. The feedback received was positive, with nearly all the respondents rating the quality, usefulness and organization of the meeting from good to excellent, and indicating that it had met their expectations. Nearly all the participants found that their expertise was very well suited for the meeting as was the expertise of their colleagues. Several respondents also indicated that they recommend follow-up related to the meeting, namely the implementation of the formulated working plan and the evaluation of the progress made by member countries in relation to climate change mitigation and adaptation. Capacity building workshops to support the development of climate change mitigation and adaptation strategies, particularly as related to the water sector, were also requested.

59. Some participants recommended the following measures to improving future meetings: fostering discussion of more detailed case studies, involving more climate change experts from the region, and encouraging greater exchange of information between countries in the region on mitigation and adaptation initiatives being undertaken.

## F. DOCUMENTS

60. The meeting documents and presentations are available on the ESCWA website at: <http://www.escwa.un.org/divisions/teams.asp?teams=Water%20Resources&division=SDPD>

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