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Annex 1 Project Description

Blue Peace – Water Security in the Middle East Strategic Management of Hydrological and Meteorological Data and Information Product Generation

Assessment of Weather, Climate and Hydrology Service and Capacities in Lebanon, Jordan (and Syria) with engagement of Turkey and Iraq

1. Introduction and Context

Climate Change will have profound impacts on water resources in many parts of the world. The countries already struggling with sufficient water supply can be further devastated by shifts in annual rainfall patterns and climate extremes. The Middle East is one of the driest regions in the world. The region is characterized by an arid to semi-arid climate. The majority of the region's countries receive less than 100 mm of rainfall. These limited resources and the low per capita share of water, coupled with the weak management of the available water resources are threatening economic and sustainable development in all vital sectors. The Intergovernmental Panel on Climate Change reports an expected precipitation decrease over the next century by over 20% for large parts of the Middle East, a likely increase in the frequency and severity of droughts and a reduction in groundwater recharge rates. Furthermore, over 60% of the region's water supply flows across international borders, underlining the need for regional cooperation, including through reinforcing the interoperability between the various national and regional hydrological observing systems and information management systems and exchanging best practices among neighboring countries.

The Middle Eastern countries of Lebanon, Jordan (and Syria) are vulnerable to climate change due to their food production and water availability. Another important impact of the climate change and variability is the change in the regime of the hazardous hydrometeorological events, such as floods and drought that affect societies and economic productivity.

Thus, Governments developing their medium and long-term climate adaptation and disaster risk reduction policies need the best possible scientific information on the expected environmental changes and respective assessment of the associated risks. The national agencies responsible for the monitoring, analysis and forecasting of the atmosphere and hydrosphere should build their capacity to provide the required advice to decision- and policy-makers by using the accumulated international knowledge and operating state-of-the-art systems for observations, data management, analysis and forecasting, and dissemination of the information products.

A High Level Group on regional water cooperation in the Middle East was launched at a meeting held in the Royal Scientific Society, Amman in April 2012 under the chairmanship of HRH Prince Hassan bin Talal of Jordan. It is an interim mechanism for 2 years to advance regional cooperation in water between Iraq, Jordan, Lebanon, Syria and Turkey including management and exchange of hydrometric data and development and dissemination of new technologies. It will further enable agreements on regional strategies to face common challenges such as climate change and drought. The HLG is independent where members serve in their personal capacity. It is not a negotiating forum. Its mandate of the Group is to develop a vision for regional cooperation, taking into account and respecting agreements and efforts between governments. In order to jump start the work of the High Level Group, a strategic 'pilot' project will be carried out to improve the management of water-related data and information, focusing on harmonizing monitoring and processing mechanisms for hydro-meteorological data.

This document describes a project proposal for the assessment of the current capacity of weather, climate and hydrology services in Lebanon and Jordan, identifying shortcomings and deficiencies vis-à-vis the existing international standards and best practices. The ultimate goal of this assessment will be to provide the input information for proposing a comprehensive capacity development cooperation project to address the identified shortcomings and support the sustainable development of these services in the two countries and in the region.

This document is prepared by the World Meteorological Organization (WMO), a specialized agency of the United Nations on weather, water and climate. It is the UN system's authoritative voice on the state and behavior of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.

The WMO will deliver the project drawing from its vast experience in carrying out weather, climate and hydrology development projects and programmes for the benefit of its Members and the people served by these institutions. In particular, WMO has recently prepared and implemented regional disaster risk reduction projects addressing early warning systems in different parts of the World, e.g., South-East Europe, Central America and the Caribbean, South-East Asia. These projects have been conducted as multi-beneficiary, multi-donor (including the European Commission, World Bank, CIDA, etc.) actions. They have all produced valuable expertise to the WMO in the delivery of tailored projects for various funding sources.

The targeted countries (Jordan, Lebanon, Syria, Turkey, Iraq) are WMO Members and belong to the WMO's network of 189 National Meteorological and Hydrological Services (NMHSs). Thus, the participation of WMO in the capacity development actions in these countries would be facilitated by the well established cooperative and technical assistance mechanisms and will bring benefits to WMO as a whole by bringing more standardization and quality to the services provided, which in turn reflects positively on similar services provided by the neighboring countries and the whole region. The practical implementation by WMO will be facilitated by the existence of a WMO Office for West Asia and the countries of the Arab League located in Bahrain, which coordinates the hydrometeorological activities and regional cooperation. The Officer in Charge, Dr Jaser Rabadi, is a former Director of the Meteorological Service of Jordan and has a vast knowledge and experience about the region. He will provide all necessary assistance in establishing the necessary links and contacts in conducting the on-site activities of the project.

2. Problem to be Addressed

Data Management Issues:

Quantitative measurements of the location, availability, quality and knowledge on current and planned /future uses of local and regional water resources are critical for sound decision making and management. The national agencies responsible for the monitoring, analysis and forecasting of the atmosphere and hydrosphere need to build their capacity to provide the required information and advice to decision- and policy-makers. To date however, in the Middle East as in most of the world, the high cost of in-situ data collection and analysis, the lack of data management systems and the non-standardized methods and protocols for data collection, management and validation across the region coupled with political instability in many cases imperatives have obstructed the development and effective use of reliable local and regional water information systems.

Leveraging Innovation:

Most of the Middle East's river basins and aquifer systems are poorly gauged or completely ungauged and it is essential to strengthen the hydro-meteorological monitoring network, which is currently declining. At the same time modern advances in technology such as (including geographic information systems, improved data assimilation platforms , and modeling techniques, and the among others), globally and freely available space-borne data (e.g. SRTM and all current and historical Landsat data) provide the supplementary only information that is readily available, and especially where in situ hydrological monitoring networks are lacking. The WMO's Integrated Global Hydrological Observing System (HYCOSGEO) provides an important set of data to the water community in general. However, the potential of remote sensing techniques to monitor hydrological extremes such as floods and droughts, to monitor water quality, and to support hydrological models is not yet entirely explored nor is it adequately used. In addition, there is a need for improved frameworks to assimilate or integrate remote sensing data into hydrological modeling systems.

Traditional In-situ Methods of Observation and New Technologies:

Space borne Data collected in this manner can provide measurements over areas where no in-situ data have otherwise been available and at greatly reduced costs as compared to traditional methods. Such data can also easily be turned into valuable information through maps and graphs that allow stakeholders and water managers to make better, more informed decisions for water management and planning. However having sufficient ground truth information (in-situ measurements) against which remote sensing algorithms can be validated and improved is also critical to effective measurement of water resources. In addition, new data sources, such as satellite remote sensing, wireless sensors, crowd-sourcing through GSM networks (e.g. iMoMo), acoustic Doppler profilers, and radar are triggering the need for continued education and training. There is thus to need to strike an adequate balance strengthening traditional, in-situ hydro-meteorological systems while at the same time leveraging the latest technical innovations from remote sensing and Earth observations, from technical, financial, and capacity standpoints.

3. Objectives and outputs

3.1 Higher Level Goal

The overall goal to which this project contributes is to strengthen the delivery of weather, water, and climate services in Middle East countries, to support economic development in agriculture, water resources, energy, and transport sectors throughout the region, manage consequences of climate variability and reduce human and economic losses from hazardous weather events notably floods and droughts. To this end, the project in its initial pilot phase will help key national stakeholders to develop an action plan to improve hydro-meteorological standards, processes and capacities, both in-situ and through innovative technologies, to:

- **Develop a methodology for comparative analysis and harmonization** of national protocols, guidelines and practical measures to standardize hydro-meteorological measurements of water quantity and quality in accordance with WMO standards
- **Develop a regional Memorandum of Understanding** between National Meteorological and Hydrological Services (NMHSs) under the aegis of the WMO to reinforce the interoperability between the various national and regional information systems, and establish a platform/database for consolidation and sharing of water-related data
- **Recommend a prioritized plan of improvement of data delivery to national users**, to be financed under subsequent phases together with countries and development partners.

3.2 Outputs of the First Phase (2012-2013). The following outputs are foreseen:

OUTPUT 1 (Oct 2012-December 2012): Needs Assessment focusing on Jordan and Lebanon, and regional coordination issues:

The assessment will focus on forming a baseline and identifying end user needs for weather, climate and hydrology services in the two countries and regionally by integrating existing Turkey and Iraq reports. The assessment will lead to a project proposal to further develop these services based on identified gaps and needs in service provision:

The assessment will focus on forming a baseline and identifying end user needs for weather, climate and hydrology services in the two countries. The assessment will lead to a project proposal to further develop these services based on identified gaps and needs in service provision. The areas of assessment are detailed in Appendix 1, Terms of Reference for Assessment and will include:

- Current institutional arrangements and capacities for the provision of meteorological, hydrological and climatological services in the targeted countries
- Current technical capacities
- International obligations:
- How the issues related to disaster risk reduction and climate change adaptation are being addressed:
- Management and administration of National HydroMeteorological Services:

After in-depth assessment of the current state of affairs in each of the areas listed above, a set of recommendations will be prepared addressing identified deficiencies, including lack of compliance with the established international standards and best practices.

The assessment will be lead by experienced experts of the WMO with the assistance of different WMO departments and programs. The assessment will include intensive in-country expert missions to both Lebanon and Jordan with a service evaluation and high-level component to coordinate the work with the governments of the two countries. To support regional cooperation, the project will organize a workshop based on the outcomes and recommendations of the assessment to formulate the key regional priorities for capacity development.

OUTPUT 2 (Nov 2012): Inception meeting hosted by the Royal Scientific Society of Jordan with Steering Committee and participation of all stakeholders,

The aim is to promote the project and raise awareness and receive feedback from the beneficiary countries on priorities and urgency of the planned activities that would allow for fine-tuning of the implementation plan.

OUTPUT 3 (October 2012-December 2012): Draft prioritized plan of improvement of data delivery to national users.

The Plan will be based on the needs assessment, with several funding scenarios, including a methodology for comparative analysis and harmonization of hydro-meteorological measurements of water quantity and quality in accordance with WMO and other international standards.

OUTPUT 4 (Early 2013): Regional Stakeholder Workshop to discuss and agree on the prioritized plan including its financing modalities (together with other development partners), and exchange relevant experiences.

This meeting will be held under the aegis of the “High Level Group” chaired by HRH Prince Talal, and hosted by the Royal Scientific Society in Jordan

OUTPUT 5 (Mid 2013): Initiate priority pilot project(s) based on the assessment and stakeholder demand, included in the prioritized plan and as agreed at the regional workshop.

These project(s) may include capacity development, knowledge sharing, field testing of approaches and techniques.

Deliverables

The project will deliver the following:

Deliverable 1: Assessment report of the weather, climate and hydrology services in Lebanon

Deliverable 2: Assessment report of the weather, climate and hydrology services in Jordan

Deliverable 3: Draft project proposal on enhancing the capacity of the targeted countries to provide hydrometeorological services contributing to reducing vulnerability to weather, climate and water hazards in the Middle East

Deliverable 4: Regional Agreement between National Meteorological and Hydrological Services (NMHSs) under the aegis of the WMO to reinforce the interoperability between the various national and regional information systems, and establish a platform/database for consolidation and sharing of water-related data

Deliverable 5: Final Report outlining main priorities and approaches for developing modern services for weather, climate and hydrology in the Middle East

4. Project Management

4.1 Steering Committee and Technical Coordination.

As agreed at the Amman meeting in April 2012, the High Level Group will act as a steering committee for the design and implementation of 'pilot' projects that support regional cooperation objectives in areas such as information and data management (this project), innovative practices and technologies, disaster management and climate change, and water resources management at basin level. The HLG will be supported by a regional technical secretariat that will coordinate the pilot projects to be designed and/or implemented by relevant actors at national, regional and global level, leveraging existing projects and processes. In the interim phase until a permanent cooperation mechanism is developed and agreed by the countries, the technical secretariat will be housed in the Royal Scientific Society (RSS) in Amman, Jordan which has substantial expertise and experience in areas relevant to the pilot projects, and enjoys an extensive network with national, regional and international actors likely to contribute to the projects.

The World Meteorological Organization (WMO) will be responsible for Outputs 1, 2 and 3, under a contribution from SDC as these Outputs also form a key component of WMO overall program, with inputs from national stakeholders, SDC, and the Department of Hydrology in the Swiss Department of the Environment:

- The WMO is a specialized agency of the United Nations on weather, water and climate. It is the UN system's authoritative voice on the state and behavior of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.
- The targeted countries are WMO Members and belong to the WMO's network of 189 National Meteorological and Hydrological Services (NMHSs). Thus, the participation of WMO in the capacity development actions in these countries would be facilitated by the well established cooperative and technical assistance mechanisms and will bring benefits to WMO as a whole by bringing more standardization and quality to the services provided, which in turn reflects positively on similar services provided by the neighboring countries and the whole region.
- The practical implementation by WMO will be facilitated by the existence of a WMO Office for West Asia and the countries of the Arab League located in Bahrain, which coordinates the hydrometeorological activities and regional cooperation. The Officer in Charge of the Office, Dr Jaser Rabadi, is a former Director of the Meteorological Service of Jordan and has a vast knowledge and experience about the region. He will provide all necessary assistance in establishing the necessary links and contacts in conducting the on-site activities of the project. In addition, the WMO Regional Training Centre in Turkey could contribute to capacity development at a later stage of the project.

The Royal Scientific Society (RSS) of Jordan will be responsible for Outputs 2 and 4, with the support of WMO, national stakeholders, Swiss and other international partners. The RSS is the largest applied research institution, consultancy, and technical support service provider in Jordan and is a regional leader in the fields of science & technology. Its Energy, Water, & Environment (EWE) cluster delivers field energy, water, and environmental measurements and analysis services and is fully supported by several nationally and internationally accredited laboratories and monitoring units which are capable of providing high level analysis and measurements.

Responsibilities for Output 5 will be defined at the Stakeholder Workshop, depending on the nature and scope of the selected pilot project(s) (Technical Secretariat under RSS could continue to coordinate regional activities, national activities by national hydromet and hydrology institutions)

Swiss Actors. The project will be coordinated by SDC WIs, with the support of relevant Coofs, and the Hydrology Unit of the Federal Department of the Environment.

Partnerships/coordination. The project will closely cooperate with:

- The recently approved (mid-2011) Global Environment Fund (GEF) project implemented by the World Bank to improve water resources and agricultural management and planning within and across selected Middle Eastern countries (including Lebanon and Jordan) based on quantitative and spatial-based decision making tools.
- The United Nations Economic and Social Commission for Western Asia (ESCWA) and the German Federal Institute for Geosciences and Natural Resources (BGR) which are cooperating since 1992 to enhance collaboration on shared water resources between ESCWA member countries, promoting the integrated management and protection of water resources.
- EXACT (which work with Israel, Palestine, Jordan) at the technical level and through global agencies such as the WMO to ensure consistency and compatibility for procedures and standards.

4.2 Risk management. Risk will be managed by following:

- Gradual approach, starting with assessment of issues and needs.
- Participatory approach, with stakeholder events and workshops (regional workshop).
- In support of global programs and initiatives (WMO, IHP, GEF...) to promote ownership and acceptance.
- Data sharing initially limited to data already in public domain, notably from remote sensing and Earth observation systems.

Budget

The total budget for the work is approximately CHF 750,000

Phase I

Output 1 and 2: CHF 200,000

Output 3: CHF 50,000

Output 4: CHF 50,000

*These are inclusive of WMO Support Cost of 13%

Phase II

Output 5: CHF 450,000

Programme of Activities:

ACTIVITIES	2012	2013		
	Qtr 4	Qtr 1	Qtr 2	Qtr 3-4
Phase I				
Activity 1: First fact-finding mission Jordan (Nov)				
Activity 2: First fact-finding mission Lebanon (Nov)				
Activity 3: Inception meeting hosted by the Royal Scientific Society of Jordan (mid – Nov)				
Activity 4: Proposal development mission Jordan				
Activity 5: Proposal development mission Lebanon				
Activity 6: Regional workshop				
Activity 7: Final Reports and Development Plans				
Phase II				

Terms of Reference

Assessment of Weather, Climate and Water Service Capacity in Jordan and Lebanon

Assessment Team

Chief WMO Regional Office in Bahrain
Chief WMO Regional Office for Europe
WMO Hydrology Expert
Expert Consultant from the Region

Scope of Work

The assessment will focus on forming a baseline and identifying end user needs for weather, climate and hydrology services in the two countries. The assessment will lead to a project proposal to further develop these services based on identified gaps and needs in service provision. The areas of assessment will include:

- ❖ Current institutional arrangements and capacities for the provision of meteorological, hydrological and climatological services in the targeted countries, including:
 - National legislative and regulatory framework that determines responsibilities for the mentioned services.
 - National agencies responsible for the provision of services (starting with the National Meteorological Service (NMS), and their position in the administration.
 - Linkages with main users and stakeholders – civil protection agencies, sector ministries (transport, environment, agriculture, etc).
- ❖ Current technical capacities, including:
 - Observing networks: synoptic, climatological, upper-air, hydrological, etc.
 - Methods for data collecting and data processing;
 - Forecasting and warning capabilities;
 - Climatological data and records;
 - Maintenance and calibration of the observing systems (data quality);
 - Research capabilities.

Quality control. What procedures and infrastructures for quality control are available and in proper use? (experiences show that especially in transboundary cooperation the accuracy/reliability/comparability of data and information play an important role for water resources management)
- ❖ International obligations:
 - Existing arrangements for regular exchange of meteorological and hydrological data;
 - Identification and analysis of key cooperation issues for the future; Compliance with international standards established by WMO, ICAO and other standard-making bodies.
- ❖ How the issues related to disaster risk reduction and climate change adaptation are being addressed:
 - Availability of the requisite elements of early warning system;
 - Working arrangements with disaster management agencies;

- Emergency and contingency planning.
- ❖ Management and administration:
 - Human resources – availability and needs;
 - Education and training;
 - Strategic Planning;
 - Quality Management;
 - Socio-economic benefits.