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## Terms of Reference

### Technical Assistance for the Demonstration Activity related to Testing innovative technologies and partnerships for food security in Lebanon

*Contributing to the Water-Energy-Food-Ecosystems (WEFE) Nexus Policy Dialogue in Lebanon  
carried out by the Global Water Partnership-Mediterranean (GWP-Med)  
in the framework of Child Project 2.2 of the GEF/UNEP MedProgramme*

#### 1. Background and objective of the demonstration activity

The demonstration activity related to **“Testing innovative technologies and partnerships for food security in Lebanon”** is carried out in the framework of the GEF UNEP MedProgramme Child project 2.2 “Mediterranean Coastal Zones: Managing the Water-Energy-Food and Ecosystems Nexus” and particularly of its Component 3.1.3.: Testing of novel applications and assessment of their replication potential and feasibility that is executed by GWP-Med.

It has been designed following discussions with partners in the framework of the 2nd multi-stakeholder Consultation on the Water-Energy-Food-Ecosystems (WEFE) Nexus in Lebanon (27-28 February 2023), as part of the WEFE Nexus Policy Dialogue launched by GWP-Med in Lebanon since 2022.

The agricultural sector is one of the entry points for the design and implementation of WEFE Nexus solutions in Lebanon. Such solutions present opportunities for positive socio-economic results - through reduced costs and increased production/income- and food security while, in parallel, has a great potential for reducing the use of water and agrochemicals, hence for enhancing the state of the environment, ecosystems and human health.

In fact, chemical pollution from the overuse of fertilisers and pesticides has been common in Lebanon, among others due to the lack of related knowledge and capacities among farmers. The current economic and financial crisis the country is facing has resulted in limitations of imports and increase of prices of agrochemicals. This has stimulated an interest for cheaper alternatives to increase soil productivity and natural ways to manage pests.

Also, at the level of irrigation, the lack of electricity for pumping and distributing water has become a constraint of increasing intensity for farming activities, along with other challenges faced by the agro-food sector due to the scarcity and higher prices of all energy products (gas, electricity and fuel for cooking, heating, transport etc.).

This situation presents obvious and direct threats to the country’s agricultural production capacity. At the same time, it presents an opportunity to build back the agricultural sector better and greener with the use of less energy, more environmentally friendly agricultural practices, with reduced costs for the farmers.

Having this in mind, the demonstration activity aims at experimenting a novel technology for Lebanon, supporting precision agriculture and aiming to reduce the need for inputs and other



resources in farming activities, therefore helping farmers in reducing their production costs and, at the same time, protecting the environment from pollution and from over-extraction of already limited water resources.

## 2. Innovative technologies to be tested in the framework of the demonstration activity

The innovative technologies that will be tested in the framework of this demonstration activity are the following:

### ▪ **SMART agro-meteorological stations for Precision Irrigation and Assessment of biomass status**

Smart **agro-meteorological stations** will be installed in Lebanese regions that are key for food production and security.

This solution is crucial for precise irrigation planning and will allow farmers to optimize water use based on current climate conditions – which is a crucial factor to ensure the health of crops and limit of diseases outbreaks - contributing significantly to water conservation efforts.

In this regard, the latest advancements in meteorological technology will be exploited to provide accurate and localized climate data.

The stations will enable to:

- acquire data via a set of sensors for (the list is not exhaustive): air temperature, atmospheric humidity, solar radiation, soil temperature and humidity, etc.)
- calculate significant parameters (e.g. ET, irrigation dosing, fertilization, etc.).
- process data for the most significant food security parameters to be calculated, including but not limited to: Irrigation dosing, irrigation schedule, risk of diseases outbreak, e.g. due to high soil humidity and temperature, plant damage risk due to high air temperature, etc.
- make available to the relevant institutions and administrations the raw data collected by the agro-meteorological stations and stored on the “cloud” in an automated manner, to support their planning and decision-making processes.
- make available to farmers key information to assist them in their work

### ▪ **Drone for Crop Monitoring**

A precision drone will be deployed to provide farmers with real-time, localized crop health monitoring insights, enabling them to take informed decisions and timely interventions to optimize their irrigation strategies and assess climate-related and other disasters. In particular, this technology-driven approach will allow farmers to better identify:

- Water stress in the parcel
- Biomass status
- Diseases
- Flash flood damages (which is a common issue in several agricultural areas in Lebanon)

### ▪ **Drone for Precise Pesticide Spraying**



A different precision drone equipped with advanced pesticide spraying capabilities will be deployed to ensure targeted and efficient application of chemicals, therefore minimizing their environmental and human health impacts.

This, along with the previously mentioned smart technologies for evaluating: 1. The overall health condition of crops to anticipate disease outbreaks and plan for proactive and reactive actions and; 2. Irrigation needs to mitigate excessive water use, which can also lead to crop diseases; establishes a comprehensive framework having the potential to decrease chemical inputs in farming practices to the minimum amounts needed, while optimizing their benefits.

Finally, water efficient irrigation equipment may be installed in the selected farms according to the needs of the intervention.

### 3. Description of the Assignment

#### **Objective**

The objective of the assignment is for the successful consultant to provide technical assistance to GWP-Med on the implementation of this demonstration activity. In particular, the successful consultant will provide the following services:

1. Collaborate with the local authorities and support the project manager towards the identification of potentially eligible farmers and suitable plots for the installation and application of smart agriculture systems/technologies. The identification process should consider various factors like crop types, soil composition, irrigation methods, inputs application (fertilizers, pesticides etc.), plot distribution, allocated budget, ownership of the land, accessibility, and more.
2. Contribute to the establishment of partnerships in each area for the planning, implementation, monitoring, follow-up and scaling-up of activities, involving all relevant stakeholders. This will also include assisting GWP-Med with the signing of Memorandums of Understandings (MoUs) with the beneficiaries and other potential partners.
3. Provide the technical specifications for GWP-Med to produce the necessary procurement documents regarding the supply and installation of the technology solutions stated in Chapter 1. In particular, technical specifications to be provided by the consultant relate to:
  - a. The required smart irrigation equipment according to the available budget
  - b. The equipment, at farm level, necessary for precision irrigation.
  - c. The crop monitoring drone
  - d. The drone for the precise spraying of pesticides

The technical specifications documents must include the following components per activity / equipment (minimum requirements):

- The Bill of Quantities (BoQ)



- The features of each sub-component (e.g. accuracy of the sensors incorporated to the agro-meteorological stations)
  - The estimated cost per activity
  - Potential suppliers / installers in the local market
4. Develop an Action plan (including a Timetable) for the detailed implementation of activities.
  5. Provide training, support and advisory services to farmers, aiming to ensure the success of the initiative and enable them to fully integrate the technology, thereby securing the sustainability of the project and its potential for future replication and scaling-up. Specifically, the successful consultant will:
    - a. Organize essential training sessions for and meetings with farmers to:
      - Comprehend the significance of the initiative.
      - Interpret and apply recommendations available on the platform provided by the supplier.
      - Implement measures based on received recommendations.
      - Understand equipment maintenance and preventive practices.
      - Update/expand the initiative in forthcoming agricultural seasons.
    - b. Coordinate with the equipment suppliers who will provide ongoing support through scheduled field visits to:
      - Aid in interpreting results effectively.
      - Assist in devising more efficient irrigation plans.
      - Offer localized assistance during the agricultural cycle.
  6. Identify and suggest the National or local stakeholder(s) who will be responsible for:
    - a. acquiring and processing data from the measurement equipment, according to the platform provided by the supplier of the equipment, and
    - b. acquiring the equipment once the demonstration period is concluded.
  7. Assist GWP-Med with the signing of an MoU with the above stakeholder(s) to ensure that equipment is delivered to the appropriate stakeholder(s) who are able to manage and maintain it, and that processing of data will be sustained after the demonstration period is over.
  8. Elaboration and proposal of predefined criteria and indicators to assess the demonstration activity results in terms of productivity, use of natural resources, pollution reduction, economic benefits etc., and in the WEFE Nexus context.
  9. Qualitative and quantitative monitoring and evaluation to assess the results of the implemented practices, against predefined criteria and indicators in terms of productivity, use of natural resources, pollution etc.
  10. Assist GWP-Med with the reporting that has to be prepared during the project period by providing the necessary information and material.

Indicatively, the successful consultant will collaborate with:



- The Lebanese Agriculture Research Institute
- The Litani River Authority
- The National Council of Scientific Research
- The farmers’ cooperatives, associations, etc.
- The local municipalities
- The Ministry of Agriculture
- The Ministry of Energy and Water
- The Ministry of Environment
- The Regional Water Establishment(s)

Any communication with the local and National stakeholders will be discussed and agreed upon with GWP-Med and will involve the participation of the GWP-Med staff responsible for the implementation of the activity.

**Expected Output**

The assignment will facilitate the smooth and efficient management of the project and will provide some of the insights and information required for scaling-up the initiative.

**Deliverables**

The Consultant will provide the following deliverables, which are directly related to the tasks/services outlined in detail under Section 3 (Objectives), based on the below timeline (expressed in months after the contract is signed). All deliverables should be submitted in English and/or Arabic depending on the deliverable and following the instruction of the project team.

Deliverables		Deadline / months after contract signature and language
1	<p>Techno-economic analysis in each area of focus to:</p> <p>a. Assess current agricultural processes and practices including consumption of water, fertilisers, pesticides.</p> <p>b. Identify needs, capacities and scope of the activities, in consultation with farmers.</p> <p>c. Identify necessary conditions for the implementation of the activities e.g. the min/max surface of the area where the activities will be implemented.</p> <p>d. Identify baseline values and indicators regarding the use of water and chemicals as well as the environmental conditions against which the activities will be monitored and evaluated.</p> <p>e. Estimate expected economic and environmental benefits.</p>	Month two (2) of the contract (English)
2	Signed MoUs by the project with the beneficiaries and other potential local partners	Month two (2) of the contract (English and Arabic)



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3	Technical specifications of the required equipment assisting GWP-Med to produce the respective procurement documents.	Month three (3) of the contract (English)
4	Action plan for the detailed implementation of activities (timeframe).	Month three (3) of the contract
5	Brief report about the National or local stakeholder(s) who have the capacity to acquire and process data from the measurement equipment and acquire the equipment itself once the demonstration period is concluded.	Month three (3) of the contract (English)
6	Signed MoU by the stakeholder(s) and GWP-Med in relation to deliverable 4 above	Month four (4) of the contract (English and Arabic)
7	Proposal of criteria and indicators to assess the demonstration activity results in terms of productivity, use of natural resources, pollution reduction, economic benefits etc.	Month four (4) of the contract (English)
8	Report of two training sessions to provide support and advisory services to farmers and local stakeholders to fully integrate the technology	Month six (6) and month (11) eleven of the contract (English)
9	Assessment presenting the results from the qualitative and quantitative monitoring and evaluation of the implemented practices/technologies, against predefined criteria and indicators (see deliverable 6)	Month eleven (11) (English)

### **Health and Safety Precautions**

Responsibility for all aspects concerning health and safety issues for the duration of this project is vested entirely in the successful consultant entrusted to do this job, who will exercise all control over operations, materials, employees, and all other factors respecting health and safety norms.

### **Reporting Line**

The successful consultant will work under the direct supervision of / and communicate directly with GWP-Med Project Team.

Coordination meetings between the consultant and the Project Team shall be scheduled on a weekly basis to effectively monitor the progress pertaining to the workplan. The rendering of services shall be executed, and completion thereof shall be determined, upon the satisfaction and approval of the deliverables by the Project Manager and Project Team.

Questions must be addressed in writing.

It is suggested that the successful consultant maintains a daily logbook of tasks for the convenience of the weekly meetings. The logbook should be available to GWP-Med Project Team upon request.

### **Confidentiality**

All information supplied by GWP-Med in connection with this tender to date, and any further information supplied during the tender process shall be regarded as confidential and must not be shared with any other organization without written permission of GWP-Med.

### **Terms and Conditions – Language**



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The language of this procedure, the tender documents and the offers is English. Any documentation (certificates, etc) submitted in any other language should be accompanied by a translation in English, certified by a lawyer or public authority.

### **Duration of the Contract**

The total service duration amounts to 9 person-months of work.

The overall duration of the contract will be for a maximum of 11 months after contract signature. Payments will be made upon acceptance and verification of the related deliverables, as laid out in section 4 “Contract Price and Schedule of Payments”.

## **4. Contract Price and Schedule of Payments**

The maximum fee for this assignment 23,750 USD. This amount includes all other costs, income taxes, **traveling to the focus areas** and any other amount payable or cost that may be required for the completion of the work/service, including VAT.

The schedule of payments is as follows:

- 20% of contract value upon completed deliverables 1 and 2
- 30% of contract value upon completed deliverables 3 and 4
- 30% of contract value upon completed deliverables 5, 6, 7
- 20% of contract value upon completed deliverables 8 and 9

## **5. Selection Criteria**

### **ON/OFF Criteria**

The scope of work requires a skilled expert with previous experience in activities similar to those incorporated in the present assignment. The consultant should possess a holistic understanding of the WEF Nexus and specialized expertise in each component—smart irrigation, sensors, piezometers, —to effectively contribute to sustainable agricultural practices. Successful participants must:

1. Possess an engineering diploma or a Master's degree in agronomic sciences, rural engineering, or a related discipline of equal standing.
2. Have minimum ten (10) years of experience on similar projects, involving the creation of optimization models for efficient irrigation water usage, encompassing tasks like estimating water requirements and monitoring agricultural season progression, fertigation and plants diseases prevention and management.
3. Have worked on minimum one (1) project in Lebanon involving the implementation of a monitoring system for agricultural development, identification of indicators, coordination of monitoring and evaluation.
4. Have worked on minimum one (1) project directly related to smart agriculture and support to farmers in Lebanon.



5. Be Proficient in English and Levantine Arabic is essential.
6. Certify that they understand the nature and needs of the demonstration activity
7. Certify that they have the needed resources to carry out the demonstration activity (e.g equipment, human resources, etc.).

For points 2,3 and 4 the Participant should provide a list of projects/assignments providing the following details for each one of them:

Title of Project / Assignment	
Date & Duration of the Project / Assignment	
Geographical area of intervention	
Contents of intervention (mention briefly key elements like type of works and key metrics)	
Cost of the Project / Assignment	
Funder and End Client (if different), contact details for reference cross checking* <ul style="list-style-type: none"> <li>• Name of the client</li> <li>• Email of the client</li> </ul> * The participants provide consent to the Contracting Authority to contact the listed clients. In case of confidentiality, please indicate	

For points 6 and 7 the Participants shall provide signed certifications using any format they prefer.