OBSERVATOIRE DU SAHARA ET DU SAHEL

SAHARA AND SAHEL OBSERVATORY

SAHARA AND SAHEL OBSERVATORY
(OSS)

SASS III Project
Operational Recommendations for a Sustainable Management of the Water Resource of the *North-Western Sahara Aquifer System* (SASS)

Subject: Call for the hiring of consultants

Terms of Reference

I- BACKGROUND

The North-Western Sahara Aquifer System (SASS) has been the subject of several studies and projects over the past few decades. As from 1970, a major Algerian-Tunisian programme, called ERESS, and implemented by UNESCO, has helped conduct—based on preliminary modelling within the borders of the two countries—an evaluation of the exploitable resources of this aquifer system, as well as forecasts related to the evolution of their use patterns. This programme was subsequently pursued under UNDP as from 1984.

Some twenty years later, i.e. in 1997, the Sahara and Sahel Observatory (OSS) launched the SASS project, this time with a view to encompassing the whole basin up to its natural boundaries.

Upon request by the three countries sharing the exploitation of the waters of this aquifer system, the OSS managed to enlist the financial support (Swiss Cooperation, IFAD and FAO) necessary for a first three-year phase (SASS I) dedicated to updating the evaluation of the aquifer system's exploitable resources. Following the quite informative results obtained with regard to the potential and limitations of this aquifer system (namely, a data base common to the 3 countries whose objective is to optimise information and serve as a data-sharing tool, on the one hand, and a mathematical model simulating the hydrodynamic behaviour of the aquifer system and helping predict the impact of the exploitation trends, on the other hand), an urgent need was felt to move on, within a second phase (SASS II), to providing an outline of the socio-economic contexts of the use of this resource and their impacts on the various components of the natural environment in the 3 countries.

As of now, it may be said that—with the aggregate knowledge about the evolution of this aquifer systems and, more particularly, thanks to the results obtained under the SASS I and SASS II projects, both of which having been conducted by the OSS—the significant potential of the SASS water reserves is amply proven, the constraints related to their exploitation are known, the advanced state of their overexploitation

has been highlighted, and the great vulnerability of the natural medium due to their use is sufficiently identified in several situations.

The North-Western Sahara Aquifer System (SASS) covers a total area of over 1 million km^2 of which 700 000 in Algeria, 80 000 in Tunisia and 250 000 in Libya. It is tapped by around 8800 water points, boreholes and springs: 3500 points in the Intercalary Continental (CI) formation and 5500 in the Terminal Complex (CT) formation (distributed as follows: 6500 points in Algeria, 1200 in Tunisia and 1100 in Libya). The exploitation pattern of this aquifer system has reported an alarming growth pace over the past few decades, amounting to around 2.2 billion m^3/year (1.33 billion in Algeria, 0.55 in Tunisia and 0.33 in Libya). This intensive exploitation pattern has significantly altered the way one should look upon it. Indeed, this must, henceforth, encompass the major risks to which this intensive exploitation is fraught with (salinisation of the resource, groundwater drawdown) and consequent increase in pumping energy cost.

The mobilisation and exploitation of this resource in the 3 countries entail risks of adverse impacts of a socio-economic and environmental nature which might jeopardise the sustainability of the development process underway in this region, of which—in particular—agricultural development, the chief user of water for irrigation purposes. The studies conducted on this issue by the OSS, within the SASS II framework, have been quite informative as to the rising trends of this threat.

Indeed, the currently rising pressure of the demand on this resource, on the one hand, and the modes of its use in irrigation, on the other hand, affect—at various degrees—the agricultural production systems, their productivity and the fertility of irrigated areas. Therefore, it is not only necessary but also urgent to boost the management and efficient use of this scarce resource which is—on top of all this, and for the major part—of a non renewable character.

The observations and conclusions reached by the SASS I and SASS II projects have built awareness among the decision-makers of the 3 countries as to the serious nature of the environmental and socio-economic risks attendant upon the future of the development of their respective SASS zones, as well as to the need to move towards a rational and sustainable management of this resource. The setting up by the 3 countries of a Mechanism for Concerted Action entrusted with the task of developing tools and guidelines for a joint management of the shared water resource has been the materialization of this basin awareness and of a commitment by the 3 countries to proceed towards developing a common vision on a SASS-wide sustainable development, and this, based in particular on irrigated agriculture and the conservation of natural resources.

Indeed, for the 3 countries concerned—i.e. Algeria, Libya and Tunisia—, the priority order held by irrigated agriculture in food security and in the development and settlement of the populations of their respective SASS zones, is a pillar of their agricultural policy and the chief means of its enactment.

In view of the urgent need to rationalise the exploitation of this resource in the 3 countries, from a sustainable development perspective, the 3 countries concerned have set up the SASS III project (entitled ***"Operational Recommendations for a***

Sustainable Management of the Water Resource of the North-Western Sahara Aquifer System (SASS)"), with assistance by their cooperation partners (FFEM (French Global Environment Facility), GEF, AfDB, AWF (African Water Facility)…), via the Mechanism for Concerted Action. The latter has recently been set up by the 3 countries, as part of the process of devising appropriate solutions for enhancing the management of this resource and optimising its use for irrigation, as well as protecting the natural resources tapped against all forms of deterioration.

This project comprises the following 5 components:

1- Additional socio-economic and environmental studies.
2- Formulation and execution of agricultural showcase projects.
3- Development of a Geographical Information System (GIS) for the SASS.
4- Assistance to the 3 countries in the process of Consultation and Dissemination of the Recommendations.
5- Assistance to Project Coordination and Monitoring-Evaluation.

The SASS III project constitutes, therefore, a framework intended to boost the process of institutionalising the methodological, technical and scientific exchanges and experience-sharing likely to help implement common approaches and strategies for a concerted and sustainable management of the SASS.

It is within the framework of this project that the OSS proposes to hire two independent, senior consultants: one socio-economist expert in the water and irrigation sector, and one agro-environmentalist expert in irrigated crop systems and soil quality.

II- SCOPE OF THE MISSIONS OF THE TWO CONSULTANTS

The scope of the missions of the two consultants encompasses the whole SASS zones of Algeria, Libya and Tunisia, totalling an area of irrigated land of approximately 200000 ha. These missions require, therefore, from the consultants considerable availability and capacity to conduct frequent travel to these zones.

The two posts share in common, over the duration of their respective missions, an overarching task of assistance to the Project Coordinator in conducting and execution of the 5 project components mentioned above. Besides, each of the consultants shall deliver a dedicated mission focused on the component of his/her area of expertise, namely:

- the "socio-economic and environmental surveys" component,
- the "showcase projects" component.

However, the two components above, though being of a different character, must be integrated in order to lead to results and recommendations useful for the various decision-makers (all the way through from the farmer, on local level, to the Water Authority, on the country's central level). For so doing, the two experts are required to work in tandem, interact regularly, exchange and integrate the results and recommendations generated by their work and issuing from it.

II. 1. Scope of the mission of the socio-economist consultant

This mission is focused mainly on the “socio-economic and environmental surveys” component. It consists in the design and drafting of the questionnaires, supervision of the socio-economic and environmental surveys on the level of the agricultural production unit, and processing and analysis of the data obtained, and this, in cooperation with the agro-environmentalist consultant and the national consultants of the 3 countries. Once the macro-economic data have been collected among the primary users of the resource, the socio-economist consultant is called upon to conduct an analysis based on most recent—and, above all, most advanced—quantitative tools (data analyses, econometric models, optimization models, etc . . .). This analysis will serve as a foundation for the operational recommendations to be put forward to decision-makers in matter of allocation of the scarce resource based on objective criteria and in the light of the actual reality experienced by the individual farmers. It is worth pointing out that the main objective of this quantified analysis will help identify the inadequacies, the bottlenecks and, above all, the productive inefficiencies of a technical and allocation order. Thanks to most recent advances in applied micro-econometrics, it would be interesting to evaluate the extent of efficiency of the current allocations of the mobilised resource and to identify the actual impediments which result in a wastage of the scarce resource, i.e. water, on farm level.

The quantification of the key socio-economic variables would also help identify the sensitivity of agricultural production to the inputs used (water quantity used, labour, manure, chemical fertilisers, etc . . .). Irrigation water demand elasticity could, thus, be calculated, which would enlighten decision-makers as to devising an appropriate tariff policy. The productive performance of farmers in terms of technical efficiency will also be analysed in order to evaluate the potential for enhancing farm production while reducing the volume of water used. The measurement of technical efficiency will be used as an indicator of wastage of the existing productive resources.

II. 2. Scope of the mission of the agro-environmentalist consultant

This mission is focused mainly on the “showcase projects” component, all the way through from their design and their tailoring to the identified local issues, to coaching the process of their execution and the monitoring-evaluation of their results in the 3 countries concerned. Besides, the mission encompasses the whole range of the agronomic and environmental aspects that have a cross-cutting dimension with regard to the other components outlined above, and, this, based on:

- Study of irrigation water related issues, throughout the SASS water tapping route (management of water points, management of water conveyance to farm inlet, management of water at location of crop growing plot), as well as of their impacts on the main crop systems in the whole SASS zone (features and governing principles of the agricultural production systems, evolution trends of these systems and their determining factors, irrigation water needs, actual water/ha allocations, water losses, irrigation dose and frequency, efficiency of drainage, crop techniques, impacts of irrigation agricultural use on natural resources, of which the soil, in particular);

- Study of the strengths and weaknesses of the various systems and their sustainability, as well as identification of the constraints hindering their improvement, rehabilitation or replacement;
- Contribution to the design of the socio-economic and environmental surveys, and assistance in their conducting.

II. 3. Scope of the joint mission of the two consultants

The consultants entrusted with the missions described above will be required to consult regularly throughout the duration of the project. This regular interaction, which is aimed at integrating the approaches and the results, will focus on the following items in particular:

- Optimising the findings of the socio-economic and environmental surveys, on the one hand, and those of the showcase projects, on the other hand, as well as their capture in the data base common to the 3 countries for their use via the GIS dedicated to this purpose;
- Contribution to the design, development and implementation of a system of monitoring-evaluation of the project results based on dedicated indicators and baseline situations grid;
- Support to the Project Coordinator in conducting the project and drafting the periodical and executive reports related to the activities and deliverables of the various components.

III. TASKS OF THE TWO CONSULTANTS

III.1. Tasks of the socio-economist consultant

- **The tasks related to the socio-economic and environmental component are as follows:**

1. The socio-economist consultant shall collect all socio-economic data available on all SASS irrigated areas and work out, based on these collected data, a representative sample of around 3000 farms. In order to minimize the costs of this undertaking, the primary units should be farm clusters rather than individual units. Each cluster, or miniature cluster set, shall constitute a survey site;
2. Design the overall questionnaire: This questionnaire should allow the collection of as many socio-economic and environmental data as possible on farm level. Indeed, the chief objective of the questionnaire is to gather acquaintance with the actual behaviour of the users of the limited resource and to elicit—above all—the know-how of the farmers in matter of input-mix, adaptation to scarcity and choice of the crops practiced;
3. Once the overall questionnaire has been established, the consultant must adjust it to key issue prevailing in the zone where the site has been selected;
4. Pilot-test, within a first phase, the questionnaire that has been established for each site on a reduced number of farmers;

5. Reformulate the questionnaire according to the results obtained by the pilot-test before moving on to the survey *per se* in the second phase;
6. The consultant must supervise the training of the national teams that will conduct the survey, while seeing to a good understanding of the questionnaire by the various field teams;
7. Supervise the crucial phase of data capture and, above all, ensure that all consistency tests, which would allow the elimination of all possible capture errors, have been systematically applied;
8. Data processing and commentary of preliminary results: The socio-economist consultant shall conduct, in direct cooperation with the agro-environmentalist consultant, an in-depth analysis of the data obtained with a view to deriving therefrom the operational recommendations likely to help decision-makers promote a sustainable management of the resource;
9. The consultant shall supervise the evolvement of the second survey campaign which will involve half of the sample selected in the first phase;
10. The consultant shall conduct, in direct cooperation with the agro-environmentalist consultant, the socio-economic and environmental studies, based on the micro-economic data obtained from the field surveys;
11. Once the micro-economic data have been collected among the primary users of the resource, the socio-economist consultant shall conduct a study based on most recent—and, above all, most advanced—quantitative tools (data analyses, econometric models, optimization models, etc . . .). This study will serve as a foundation for the operational recommendations to be put forward to decision-makers in matter of allocation of the scarce resource based on objective criteria and in the light of the actual reality experienced by the individual farmers.

- **The tasks related to the showcase projects are as follows:**

1. Based on the results obtained in the analysis phase, the socio-economist consultant shall participate actively, together with the agro-environmentalist consultant, in the final choice of the showcase sites and, above all, in the choice of the users to include in each showcase site;
2. Participate, together with the agro-environmentalist consultant, in deriving and formulating the operational recommendations issuing from the results obtained in view of the showcase/pilot experiences of the project for a sustainable management of the SASS resource;
3. Participate, in direct cooperation with the agro-environmentalist consultant, in coaching the technical management of the six showcase projects with regard to their design, systemic set-up, execution and monitoring-evaluation of their results in the 3 countries.

III.2. Tasks of the agro-environmentalist consultant

Task related to the socio-economic and environmental component

The consultant shall participate, together with the socio-economist, in the execution of this component in its agronomic and environmental aspects. He/She shall contribute in setting out the approach to be adopted, the identification and consideration of the agronomic and environmental parameters relevant to the project objectives, design of the survey forms, their validation based on full-size samples, and conducting of these surveys, as well as exploitation of their results.

- **Tasks related to the showcase projects component**

The consultant shall assume responsibility over the technical management of the 6 showcase sites selected, and this, with regard to their design, systemic set-up, execution and monitoring evaluation of their results in the 3 countries, and this, with the participation of the socio-economist consultant, the national consultants hired for this purpose and any resource persons likely to be enlisted for this task. He/She shall have to:

1. gather acquaintance with the issues pertaining to the local showcase pilot projects of restoration/rehabilitation and sustainability of the targeted irrigated crop systems;
2. develop the specificities of the participatory approach to be adopted for the execution of each showcase project;
3. identify and provide a detailed rationale for the activities to be undertaken under each showcase project and plan the execution thereof;
4. design a grid of indicators for monitoring-evaluation of the execution of the showcase projects;
5. design a grid of showcase project performance indicators;
6. ensure monitoring-evaluation of the performance of the showcase projects (expressed in terms of irrigation water use efficiency, crop yields and water user income) and their adoption by the farmers;
7. monitor and evaluate the process of dissemination of the results of the showcase projects;
8. supervise the drafting of the periodical reports of the national agro-environmentalist consultants;
9. ensure the delivery of annual executive reports on the results of the showcase projects;
10. participate in the preparation of the national and regional workshops provided by the project and the drafting of their proceedings;
11. participate, together with the socio-economist consultant, in eliciting and formulation of the operational recommendations ensuing from the results of the project components for a sustainable management of the SASS water resource.

IV. DELIVERABLES BY THE TWO CONSULTANTS

The results obtained, due to the missions conducted by the two consultants, must be integrated into finalised overall deliverables as follows:

- with regard to the "socio-economic and environmental surveys" component, the socio-economist consultant shall deliver, in cooperation with the agro-environmentalist consultant, regular (quarterly, annual and final) reports on the progress status and results of the surveys. The final report must be validated by the Project Coordinator. The relevant quantified data shall be incorporated in the data base and used in the GIS applications;
- with regard to the "showcase projects" component, the agro-environmentalist consultant shall deliver, in cooperation with the socio-economist consultant, regular (quarterly, annual and final) reports on the whole phases of execution of the showcase projects, as well as on the use of their technical, economic and environmental results;
- concerning the other components, the consultant shall participate in the drafting of the final reports related thereto and their incorporation in the project general report;
- production and formulation of operational recommendations based on the results of the showcase projects and of the other project components.

V. CONSULTANT PROFILES

- ***The socio-economist consultant must***

- hold an advanced university degree in economic sciences;
- have at least 15 years experience in the field of socio-economics applied to the management of natural resources and the environment (Water Demand Management, Sustainable Development);
- have a sound experience in matter of qualitative evaluation of the socio-economic and environmental impacts of hydro-agricultural projects;
- have a sound experience in the design, conducting and analysis of field survey data;
- have perfect control over the tools of socio-economic analysis and modern quantitative methods;
- be conversant in Arabic, French and English;
- be immediately available in case of selection for the post.

- ***The agro-soil consultant must***

- hold an advanced university degree in agronomic sciences and natural resources,
- have at least 15 years experience in the field of agro-environmental expertise, fair knowledge about the SASS question and the risks attendant upon the sustainability of the agricultural production systems and the natural resources mobilised;
- have an in-depth knowledge about the typology of the soils of the SASS zone and their functioning under irrigated regime;

- have a long experience in matter of monitoring-evaluation of the negative impacts related to crop patterns in irrigated areas and of restoration of degraded irrigated land;
- have proven experience in inter-disciplinary development projects on local level;
- be conversant in Arabic, French and English;
- be immediately available in case of selection for the post.

VI. DURATION OF THE MISSIONS

The duration of the project is three consecutive years. Commencement of the project is due for August/September 2009. The missions of the two consultants extend over the whole duration of the project, but with selective interventions encompassing all the tasks outlined above. They are distributed as follows:

- for the socio-economist consultant, the duration of the mission is 25 Men/Months throughout the project, broken down as follows:

    1) 1st year: 9 men/months/year
    2) 2nd year: 8 men/months/year
    3) 3rd year: 8 men/months/year.

- for the agro-environmentalist, the duration of the mission is estimated as 25 Men/Months throughout the project, broken down as follows:

    1) 1st year: 9 men/months/year
    2) 2nd year: 8 men/months/year
    3) 3rd year: 8 men/months/year.

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VII. BIDS

Technical bids

Based on the project objectives and the missions assigned to the two consultants, the experts wishing to apply for these posts are requested to submit their technical bids related, on the one hand, to their specific missions and, on the other hand, to the modes of integration of their deliverables throughout the duration of the project.

The technical bid related to the socio-economic component shall comprise in particular:

- A detailed description of the steps necessary to conducting the field survey aimed at collection, checking and capture of all socio-economic and environmental data;
- An overview of the methodological approach to be adopted for the analysis and use of the data thus collected, and this, in order to develop

the operational recommendations which will be put forward to decision makers in matter of allocation of the scarce resource based on objective criteria and in view of the actual reality experienced by the individual farmers;

- A timeline for the execution of the various components of the socio-economic study (collection of preliminary data; collection of basic sample; design of the questionnaire; field survey; capture and checking of data; study of, and commentary, on the results; proposal of operational recommendations).

The technical bid related to the agronomic and environmental component (execution of the showcase projects) shall comprise in particular:

- Description of the methodological approach to be adopted for the execution of the showcase projects based on their specific issues;
- Identification and planning of the main phases of execution of the showcase projects;
- Criteria for the selection of the technical innovations to be adopted in each of the showcase projects with a view to enhancing irrigation water efficiency and the sustainability of irrigation;
- Description of the participatory approach to be adopted in the execution of the showcase projects and the dissemination of the results;
- Identification of the modes of coordination of the roles of the various players on local, national and OSS level.

The CV of the consultants should be joined to the technical offer.

The two consultants shall present jointly the methods of integrating the planning of their tasks and their results within a consistent approach. The offers can be submitted in a joint way.

Financial bids

The financial bids shall comprise the total bid amount including the cost of the meetings (a two-day meeting, once every two months, in Tunis, at OSS headquarters).

The field missions (perdiem and plane tickets) are covered by the project.

Dead line of the handing-over of the offers

The offers should arrive at the OSS headquarters under closed folds at the latest on Friday, July 31st, 2009 at 13:00.