

UNITED NATIONS ENVIRONMENT PROGRAMME

**Terminal Evaluation of UNEP/GEF Project GF/1030-03-06
(4728) Managing Hydrogeological Risk in the Iullemeden
Aquifer System (IAS)**

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Acronyms

ABN	Niger Basin Authority
AGRHYMET	Centre Regional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle
CIDA	Canadian International Development Agency
ECOWAS	Economic Community of West African States
ESA	European Space Agency
FAO	Food and Agriculture Organisation (United Nations)
ETH	Eidgenössische Technische Hochschule (Swiss Federal Institute of Technology)
GIRE	Integrated Water Resources Management
IAS	Iullemeden Aquifer System
IAEA	International Atomic Energy Agency
IGRAC	International Groundwater Resource Assessment Centre
IRD	Institut de Recherche pour le Développement (French)
ISARM	International Shared Aquifer Resources Management programme
Min	Ministry of
NGO	Non Governmental Organisation
OSS	Sahara and Sahel Observatory
TDA	Transboundary Diagnostic Analysis
UNEP	United Nations Environmental Programme
UNESCO	United Nations Scientific and Cultural Organisation

Terminal Evaluation of the UNEP GEF project “Managing Hydrogeological Risk in the Iullemeden Aquifer System”

1. Executive Summary

The countries of Mali, Niger and Nigeria undertook a project to jointly identify and manage the risks associated with sustainable water use of the Iullemeden Aquifer System (IAS). The project was executed by the Observatoire du Sahara et du Sahel (Sahara and Sahel Observatory - OSS) based in Tunisia. The OSS brought with it a high level of expertise in transboundary aquifer mapping and modelling, having been the executing agency for the North West Sahara Aquifer System project.¹

The principle focus of the project was the establishment of technical capacity within the region to undertake a cooperative framework to jointly identify, reduce and mitigate transboundary risks to the IAS occurring from land use changes and climate change.

The immediate project objectives were to:

1. Establish joint mechanisms and capacity to identify risk and uncertainty issues in the IAS related to:
 - a. land use change in recharge areas and humid zones,
 - b. climate change with reduced net precipitation, and
 - c. inappropriate development, extraction and surface based water pollution and salinization.
2. Establish mechanisms to formulate policies for management of identified risk and uncertainty issues, and
3. Establish a legal and institutional IAS cooperative framework

The project consisted of 5 major components:

- Identification of transboundary risk,
- Policy and institutional mechanisms for reducing transboundary risk (developing a management framework),
- Awareness participation and communication,
- Project monitoring and evaluation, and dissemination of data, and
- Project coordination and management

The total project budget was US\$ 1,738,200 with US\$ 958,000 funded by the GEF Trust Fund and co-funding of US\$ 780,000. The project secured an additional €150,151 from CIDA for project management, and US\$ 169,500 from stakeholder Governments in the form of in-kind contributions for field studies and data gathering.

Key Project Findings²

¹ Protection of the North West Sahara Aquifer System (NWSAS) and related humid zones and ecosystems, GEF/2010-03-06.

² (OSS (2007a). *Analyse Diagnostique Transfrontalière du Système Aquifère d'Iullemeden*. l'Observatoire du Sahara et du Sahel, Tunis, March, 2007)

- The main transboundary risks are the **decrease in water resources**, due to increasing withdrawals; **degradation of water quality**, due to contamination; and **impacts of climate change**;
- Estimated extraction of the aquifer system exceeds estimated recharge to the system by about 25%;
- There is complex and dynamic interaction between the surface waters (River Niger) and the aquifer systems, each supplying the other at various points; and
- Deterioration of water quality due to pollution and natural fluorides in some locales.

There is consensus for the need to develop more cohesion between the countries to avoid future problems associated with groundwater use through the establishment of a consultation and management mechanism.

Evaluation

This evaluation is based on project-related documentation produced between January 2004 and October 2008; 29 stakeholder visits and interviews in Mali, Niger and Nigeria, as well as the OSS offices in November 2008; and finally interviews with international experts and program officers.

Main Conclusions

Promoting Cooperation

The project was very effective in initiating cooperation between the technical echelons of the countries over shared groundwater resources. It was clear from interviews that there is a strong cadre of hydrological professionals who are dedicated to advancing the sustainable use of the groundwater resources of the region. This is an extremely important step forward in a region which has traditionally focused on surface water cooperation, through organizations such as the Niger Basin Authority (ABN), but where the vast majority of the water use is derived from groundwater sources.³

Advancing scientific approaches:

Cooperation has predominantly focused on information and data exchange to build a greater understanding of the principal risks and issues affecting groundwater use, through the development of a TDA;⁴ knowledge of the aquifer system through the creation of a common database of bore hole information;⁵ and the creation of a numerical model for the principle aquifers.⁶ The project proponents, OSS in particular, appear to have ensured a relatively high degree of scientific rigour in developing the tools; including the use of digitized topographic maps to calculate piezometric levels; satellite imagery and remote sensing to help determine land-use patterns;⁷ extensive recovery of existing information by national teams to provide over 17000 water points;⁸ isotope studies for measuring recharge rates;⁹ amongst others.

³ Ibid..

⁴ Ibid.

⁵ OSS (2007b). *A Common Database of the Iullemeden Aquifer System (Bases de Données Commun du Système Aquifère de l'Iullemeden)*. Sahara and Sahel Observatory, Tunis, December, 2007.

⁶ OSS (2007c). *Hydrogeological Model of the Iullemeden Aquifer System*. Sahara and Sahel Observatory, Tunis, December, 2007.

⁷ This was conducted as part of the ESA-TIGER initiative, where ESA (through GAF) supplied remote imagery which subsequently land verified.

⁸ Note that only approximately 8% of them are of much use for hydrological modelling. But others can become useful with the addition of simple data such as coordinates. Ould Baba Sy, M. (2008) Hydrogeologist and

There is consensus among the stakeholders that the development of the database and model have been excellent focal points for catalyzing cooperation, building trust and promoting common goals of sustainable use (See section 4.1). Indeed this is acknowledged at the Ministerial levels.¹⁰ However, due to differences in national data collection, there continue to be marked gaps in information. Nigeria, for instance, while accounting for the bulk of water extraction has only 300 data points (some 2%) in the common database.¹¹ Consequently, it is also acknowledged that to become a real driver to direct policy change and action, the model will need refinement and updating to ensure its reliability.¹²

Examples include the potentially large uncertainty regarding the extrapolation methods used to assess extraction rates from the different countries and the use of adjacent bore hole data, which can be tens of kilometres away, to check for quality in piezometric levels, transmissivity and other parameters. These are the most appropriate methods at this stage and scope of the model. However, in certain areas of concern greater accuracy and reliability will likely be needed to develop policy.

Increase the capacity of the participating countries

The project was designed and implemented to enhance regional capacity for dealing with transboundary risks associated with the IAS. At the technical level training was given in database development, harmonisation and modelling aspects. Within the appropriate line ministries, each country has the hard-ware, soft-ware and human capacity to run the models.¹³ The promotion of the project has developed and stimulated increased awareness and activities surrounding groundwater at the national level as well as the international level. In Mali, for instance, this project has directly spawned the development of courses in groundwater modelling at the university level to enhance the national capacity in the future.¹⁴ Moreover, it is anticipated that tools developed under the project will be applied to some local issues in the near future. At the regional level, the ABN is developing a new flow model for surface water and are interested to integrate groundwater modelling information to better understand integrated water management in the region.¹⁵

modeller, IAS Project, OSS. Personal communication 10-12 November. It should also be noted, that the vast majority of these points, some 94%, are in Niger. OSS (2007b). *A Common Database of the Iullemeden Aquifer System (Bases de Données Commun du Système Aquifère de l'Iullemeden)*. Sahara and Sahel Observatory, Tunis, December, 2007.

⁹ This was a parallel project headed by IAEA in several pilot sites in Nigeria and Niger.

¹⁰ Guero, A. (2008) Directeur de Ressources en Eau, Ministère de l'Hydrologique, Niger. Personal communication 13 November, 2008

¹¹ See page 9 OSS (2008o). *Scientific Report: Management of the Hydrological Risks of the IAS*. Sahara and Sahel Observatory, Tunis, March, 2008; also see page 20 OSS (2007b). *A Common Database of the Iullemeden Aquifer System (Bases de Données Commun du Système Aquifère de l'Iullemeden)*. Sahara and Sahel Observatory, Tunis, December, 2007, Ould Baba Sy, M. (2008) Hydrogeologist and modeller, IAS Project, OSS. Personal communication 10-12 November.

¹² Chabo, J. (2008) Director of Nigeria Hydrological Service Agency, Ministry of Agriculture and Water. Personal communication 18 November, 2008, Guero, A. (2008) Directeur de Ressources en Eau, Ministère de l'Hydrologique, Niger. Personal communication 13 November, 2008.

¹³ Bouare, D. (2008) Data base and modelling Expert for IAS Administrateur base SIGMA Centre de Documentation et d'informatique de la DNH, Mali. Personal communication 21 November, 2008, Mukaile, B. (2008) GIS and Modelling Expert for IAS, Hydrological Services Agency, Ministry of Agriculture and Water Resources, Nigeria. Personal communication 19 November, 2008.

¹⁴ Traore, A. Z. (2008) Director of UFAE, Professor at Ecole National des Ingénieurs, Mali. Personal communication 21 November, 2008.

¹⁵ Enoumba, H. C. (2008) Chef Division Etude de Planification, Autorité du Bassin du Niger. Personal communication 14 November, 2008.

Legal and institutional cooperation framework

Based on the understanding developed through the TDA and model, the project has advanced the creation of an SAP through the development of high-level policy direction for the joint management of the aquifer system;¹⁶ and an overview strategy for building public awareness.¹⁷ As there is no appropriate existing institutional arrangement able to address the IAS, the countries agreed that it is important to develop a functional legal mechanism to address management issues of transboundary risks. To that end the countries agreed to create a tripartite steering committee supported by a technical and scientific committee. It remains to be decided if this structure would reside in an existing institution such as ABN or ECOWAS, or whether a new institution should be created.¹⁸ Nevertheless, the project was able to develop a draft protocol for a consultation and coordinated management mechanism for the IAS, which has been supported at the Ministerial level in all countries. The relevant Ministers have drafted letters to the FAO, Development Law Services, requesting additional assistance to complete a formalised mechanism,¹⁹ and Mali is advancing the process by mobilising its own resources to host a meeting of Ministers in 2009.²⁰

Moreover, it should be noted the countries have been able to engage in consultation and information exchange without a formalised legal framework. The current temporary consultation mechanism, where OSS receives updates from the different countries and sends out a revised database to all countries, will likely function for the next two to three years at least, providing modest support can be found for its operation, while the countries develop a formalised mechanism.

¹⁶ OSS (2008g). *Policy elements for transboundary risks reduction of the Iullemeden Aquifer System (IAS)*. Managing Hydrological Risk in the Iullemeden Aquifer System, Sahara and Sahel Observatory, March, 2008.

¹⁷ OSS (2008e). *Participatory Management of Transboundary Risks*. Managing Hydrological Risk in the Iullemeden Aquifer System, Sahara and Sahel Observatory, Tunis, April, 2008.

¹⁸ OSS (2008i). *Regional Workshop Report - Atelier régional sur le Mécanisme de concertation du Système Aquifère d'Iullemeden (SAI)*, (Workshop on a Regional Consultation Mechanism for IAS), Tunis, 23-26 June, 2008. Sahara and Sahel Observatory, 26 June, 2008

¹⁹ See Annex D "Letters requesting support for FAO assistance"; also Burchi, S. (2008) Senior Legal Officer, Development Law Service, FAO. Personal communication 5 November, 2008

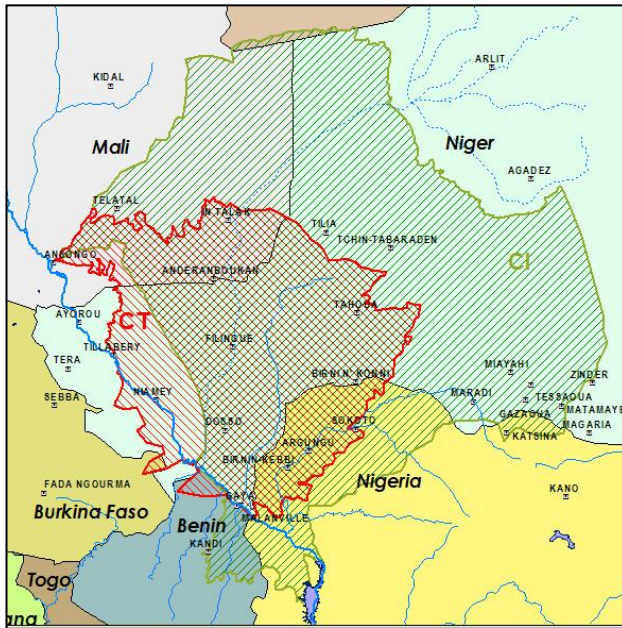
²⁰ Keïta, M. (2008) Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau. Personal communication 21 November, 2008

2. Introduction and background

2.1 Context

The Iullemeden Aquifer System (IAS) is situated in the arid and semi arid zone of West Africa. It expands between the latitudes 10°30 and 22° N and the longitudes 0°50 and 9°20 E. It covers 500.000 km² and is principally shared among Mali, Niger and Nigeria, in the approximate percentages of 6%, 82% and 12%, respectively. The IAS, as a whole, however, also includes Algeria and Benin.²¹ Figure 1 shows that the system is characterized by two major aquifers: the Continental Intercalaire (CI – in green) and the shallower and smaller

Fig 1 Iullemeden Aquifer System



Continental Terminal (CT - red). The aquifer system receives approximately 150 million m³/year modern recharge along its basement fringes in the river valleys with runoff from the bordering highlands in Mali, Niger and Nigeria. However, estimates of water use currently exceed 200 million m³/year, and aquifer levels have dropped substantially in some areas over the past decades.²²

The basin is home to some 15 million, with 65 per cent in Niger, 34 per cent in Nigeria and 2 per cent in Mali. This is projected to grow to 28 million by 2025.²³ Over the last 50 years, the land use in the recharge areas has changed and affected the recharge to the upper aquifer. With agriculture expanding into marginal low-rainfall areas and resulting land use change in recharge

areas and humid zones the environmental threats and transboundary risks in Iullemeden Aquifer System (IAS) are growing. The project concluded that:

- Aquifer levels have dropped markedly in some areas, particularly in the CT;
- There is a complex and dynamic interaction between the surface water regime and ground water regime, with each supplying the other at different locations and in different seasons; and
- Over exploitation is likely to exacerbate existing problems.

The adverse impacts are expected be amplified further from climate change with reduced precipitation and increasing evaporation losses and impacts from declining water levels on the vegetation cover in the humid zones. In addition, the risks for degradation in water quality, with transboundary implications, from salinization, water pollution and inter-aquifer leakage

²¹ The TDA showed that the IAS also covers parts of Algeria, Benin, and Burkina Faso. OSS (2007a). *Analyse Diagnostique Transfrontalière du Système Aquifère d'Iullemeden*. l'Observatoire du Sahara et du Sahel, Tunis, March, 2007, OSS (2008a). *Integrated Management of the Water Resources of the Iullemeden Aquifer Systems, the Taoudeni and River Niger: Identification Document of the Project*. Sahara and Sahel Observatory, Tunis, April, 2008.

²² OSS (2008o). *Scientific Report: Management of the Hydrological Risks of the IAS*. Sahara and Sahel Observatory, Tunis, March, 2008

²³ OSS (2008e). *Participatory Management of Transboundary Risks*. Managing Hydrological Risk in the Iullemeden Aquifer System, Sahara and Sahel Observatory, Tunis, April, 2008

and contaminant transport need to be identified and managed. Management of transboundary aquifer issues are of thus paramount importance for sustainable development in the region.

2.2 Project Background

The concept of the project began with a UNESCO mission to Mali, Niger and Nigeria, in July 2001 and a subsequent project forming workshop in February 2003. With GEF endorsement, the project began in January 2004, was given an extension of 18 months, and terminated in June 2008.

Within the goal of sustainable environmental protection and sub-regional and national development, the general objective of the project was to establish capacity under a sustainable cooperative framework for joint management of risk and uncertainty, to jointly identify, reduce and mitigate transboundary risk from changing land and water use and from climate change in the shared Iullemeden Aquifer System.

In the Project Brief²⁴ the immediate objectives of the project were to:

- (1) Establish joint mechanisms and capacity to identify risk and uncertainty issues in the IAS related to:
 - a. land use change in recharge areas and humid zones,
 - b. climate change with reduced net precipitation, and
 - c. inappropriate development, extraction and surface based water pollution and salinization
- (2) Establish mechanisms to formulate policies for management of identified risk and uncertainty issues, and
- (3) Establish a legal and institutional IAS cooperative framework.

The Expected Project Outcomes were anticipated as:

- a. Joint mechanisms for identification of transboundary risk issues in the IAS,
- b. Joint mechanisms for policy formulation and implementation to address transboundary risk issues in the IAS,
- c. A joint development and conservation strategy for the IAS,
- d. A joint tripartite legal and institutional cooperative framework for the IAS.
- e. Joint programmes for awareness, participation and inter-government communication

The Project Components were envisioned as follows:

- Component 1: Identification of Transboundary Risk.
- Component 2: Policy and Institutional Mechanisms for Reducing Transboundary Risk
- Component 3: Awareness, Participation, Communication.
- Component 4: Project Monitoring and Evaluation, and Dissemination of Data
- Component 5: Project Coordination and Management.

2.2.1. Technical Partners

As defined in the Project Brief, the following co-financing and technical cooperation partners were identified:

²⁴ GEF (2003a). Project Brief: Managing Hydrological Risk in the Iullemeden Aquifer System, March 2003. retrieved 10 November, 2008 from http://www.gefweb.org/Documents/Medium-Sized_Project_Proposals/MSP_Proposals/Regional_-_Iullemeden_Aquifer_System.pdf

- a. IAEA sub-project ‘Development of Water Resources in the Iullemeden Aquifer System’;
- b. FAO-TCP legal assistance on ‘Establishment of a mechanism for tri-partite consultation in the management of the Iullemeden Aquifer System’,
- c. IRD- HSM, ‘analysis of recharge in the IAS in Niger’.
- d. ETH, ‘capacity in aquifer modelling’,
- e. UNECE, ‘monitoring of the transboundary IAS’, and
- f. ESA-UNESCO Tiger, ‘Earth observation applications and technology at selected sites in the IAS’.

2.2.2. Program of activities

Initiation Period January- April 2004.

UNESCO/IHP administered the 1st Project Steering Committee, at UNESCO in Paris, on 23-25 February 2004. Work included identification of the Project Steering Committee, National Coordinating Committees, and Inter-Ministry Committees and the Scientific Coordinating Committee, as well as project management structures.²⁵

Period May 2004 – December 2005.

Work included: finalisation of the UNEP-OSS agreement for project execution, and formulation of a project management work plan based on the project brief; the OSS- Regional Project Coordinator were established at the AGRHYMET Regional Centre in Niamey;²⁶ regional and national meetings and workshops were held under the co-financed activities; distant learning such as IAS digital windows with UNESCO assistance at the IW-LEARN and IGRAC web-sites in mid 2005; the continuation of the development of National Coordinating Committees and developing support at inter-ministerial level. Both the process to develop the TDA and the tri-partite consultation mechanism, supported by the FAO, were initiated in 2005.

Certain technical relationships and activities were clarified after the project was initiated which deviated from the anticipated workplan. For example the modelling training to be conducted by ETH could not be conducted for the proposed cost.²⁷ OSS then took on the role of conducting capacity development and training with respect to the modelling. Another change in activities was the fieldwork of studies for recharge proposed to be conducted by IRD, which was altered to become an analysis of existing data.²⁸

In light of the alterations in 2004 and the first half of 2005, a “*New Orientation*” for the project was developed in June 2005, with significant changes in activities and corresponding budget.²⁹

In order to adequately assess and evaluate the project, it is important to note the shift in activities and outputs that occurred. Figure 2 shows the general alteration in activities and

²⁵ UNESCO (2008). *DRAFT: Appraisal of GEF-IW MSP Managing Hydrogeological Risk in the Iullemeden Aduifer System (IAS)*. UNESCO, October, 2008. Much of this section is based on this document.

²⁶ Dr. Abdul Kader Dodo had his base in Niamey, Niger. However, he moved to Tunis to develop the OSS project team in mid 2005.

²⁷ ETH (2004). *Letter from ETH regarding funding for modelling and capacity development*. Eidgenössische Technische Hochschule Zürich, Swiss Federal Institute of Technology Zurich, Zurich, 1 January, 2004. It was indicated that the initial \$30,000 was not sufficient and that approximately \$190,000 would be needed.

²⁸ Dodo, A. K. (2005). *Message regarding: Aquifer Recharge Study*. Sahara and Sahel Observatory, 21, October, 2005. The original activity was for \$85,000 and the reduced activity became \$25,000.

²⁹ OSS (2005d). *New Orientation*. Sahara and Sahel Observatory, Tunis, June, 2005.

focus between the initial project components and the ‘New Orientation’, and their relationship to project outputs as evaluated in this report.

The major shifts in activities were associated with an emphasis on hydrological monitoring and information collection at the national level. It was determined that a greater understanding of the hydrological system would assist in policy development, the creation of a consultation mechanism, and the development of a public awareness strategy. This shift resulted in increased support at the national level for information gathering.

These shifts in activities coincided with appropriate budget shifts which were approved of by UNEP.³⁰

Period January 2006 - December 2006.

February saw the second Steering Committee meeting in Abuja, as well as continued national and regional workshops. During this period substantial advances were made to the TDA and the FAO supported consultation mechanism as well as the development of digitized mapping for land use, supported by ESA, and modelling tools. The FAO terminated their support with a regional workshop in Rome, October 2006.

This period also saw another shift in management focus regarding the Common Database upon which the modelling tool would run. Initially it was conceived that the IAEA in coordination with AGRHYMET (in Niger) would develop the electronic database. Correspondence from OSS to AGRHYMET in both 2005 and November 2006, requested information regarding the development of the database.³¹ As the database had either not been developed or not shared, OSS determined that it would take the lead in developing the database and model. Email correspondence with IAEA suggested that they did not participate closely with this project, but had a parallel project dealing with isotopes³² and communicated directly with the countries as opposed to with OSS.

Period January 2007-June 2008 (project extension 18 months).

The project activities were extended to June 2008 under the approval of UNEP.³³ The bulk of the workshops, training and output development took place during this period and the extension allowed for the successful completion of the activities (see section 4.3).

2.3 Evaluation Background

The UNEP contracted Mr. Glen Hearn to carry out the Terminal Evaluation of the Managing Hydrological Risks in the IAS. The TE was conducted between October and December of 2008; and included site visits to Tunisia, Mali, Niger and Nigeria as well as interviews through telecommunications and a review of relevant project documents (Section 3).

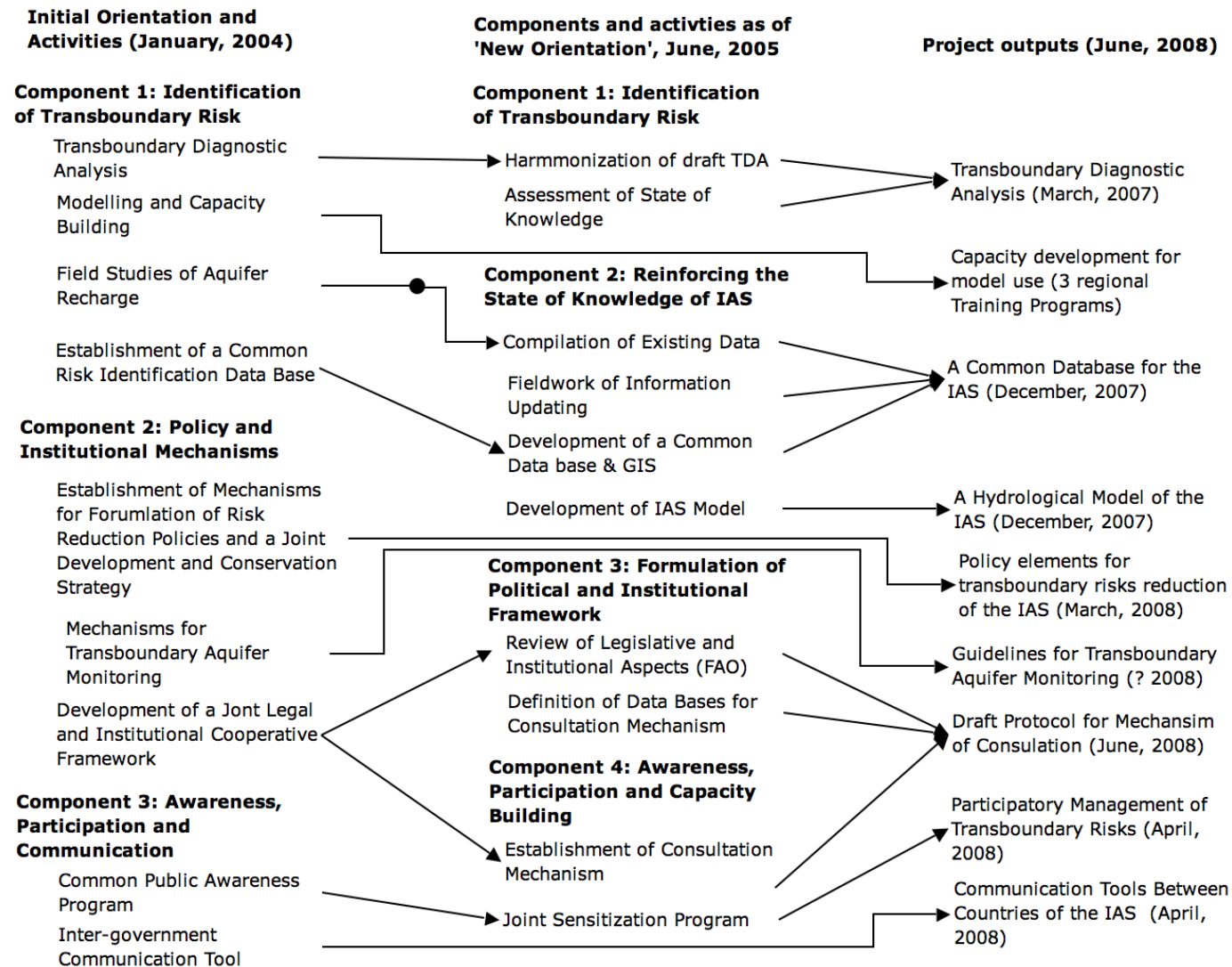
³⁰ Ben Saoud, M. N. (2008) Internal Auditor, OSS. Personal communication 10-11 November, 2008, Dodo, A. K. (2008) Regional Coordinator, IAS Project, OSS. Personal communication 10-12 November, 2008. Nakamura, T. (2008) UNEP/GEF International Waters SPO. Personal communication 27 November, 2008.

³¹ OSS (2005). *Letter to AGRHYMET requesting information for a common database.* Sahara and Sahel Observatory, Tunisia, 25 July, 2005; and OSS (2006). *2nd Letter to AGRHYMET requesting information for a common database.* Sahara and Sahel Observatory, Tunisia, 8 November, 2006.

³² Aggarwal, P. (2008) Programme manager, Water Resources, Division of Isotope Hydrology Section, IAEA. Personal communication Email correspondence, 18 November, 2008

³³ Nakamura, T. (2008) UNEP/GEF International Waters SPO. Personal communication 27 November, 2008

Figure 2: Schematic of Activities and Outputs



3. Evaluation Scope, objective and methods

The following evaluation was conducted between October and December of 2008. It included site visits to Tunisia, Mali, Niger and Nigeria as well as interviews through telecommunications (see Annex A: List of Interviewees) and a review of relevant project documents (See Annex B: References, Documents Reviewed and Personal Communications).

3.1 Scope

The evaluation focussed on the activities and products of project from its inception in January 2004 until its termination in June 2008. It does however include developments resulting from the project up to and including November 2008. A Phase II is being discussed in which it is anticipated that the knowledge base acquired during the project will be further developed; a legal mechanism is formalised; and the process of promoting transboundary groundwater management is extended to include the Taoudeni-Tanezrouft aquifers and the River Niger.³⁴ Naturally, elements of the proposed Phase II were brought up during the discussions and interviews. However, focus was kept regarding their relevance to the evaluation of this initial project.

3.2 Objective of Evaluation

The evaluation was conducted to assess the extent to which the project was able to:

- a. Establish cooperation among the participating countries in addressing the issues related to the shared aquifer system?
- b. Promote scientific approaches as a basis for building cooperation among the countries, including enhanced data information management, analysis of transboundary issues, developing monitoring mechanisms, use of models, etc.?
- c. Increase the capacity of the participating countries in addressing the identified transboundary issues related to the shared aquifer system?
- d. Establish a legal and institutional cooperation framework which can be firmly sustained by the participating countries?

3.3 Methods

The evaluation consisted of:

1. A desk review of project documents including, but not limited to:
 - (a) The project documents, outputs, monitoring reports (such as progress and financial reports to UNEP and GEF annual Project Implementation Review reports) and relevant correspondence.
 - (b) Notes and reports from the Steering Group meetings, and other meetings and workshops.
 - (c) Other project-related material produced by the project staff or partners.
 - (d) Relevant material published on the project web site.
 - (e) Correspondence
2. Interviews and email correspondence with project management and technical support including the staff from the OSS, UNESCO, FAO, IAEA;

³⁴ OSS (2008a). *Integrated Management of the Water Resources of the Iullemeden Aquifer Systems, the Taoudeni and River Niger: Identification Document of the Project*. Sahara and Sahel Observatory, Tunisia, April, 2008

3. Interviews and telephone interviews with intended users for the project outputs and other stakeholders involved with this project.
4. Interviews with the UNEP project task manager
5. Field visit to Mali, Niger and Nigeria.

The interviews, while appropriately focussed, were guided by a general questionnaire (Annex C: Questionnaire)

4. Project Performance and Impact

The following section provides a review of the project performance and impact based on eleven evaluation aspects (A-K) as provided by the UNEP. The evaluation is generally performed based on a 6 point constructed scale whereby:

HS	= Highly Satisfactory
S	= Satisfactory
MS	= Moderately Satisfactory
MU	= Moderately Unsatisfactory
U	= Unsatisfactory
HU	= Highly Unsatisfactory

4.1 A: Attainment of objectives and planned results:

4.1.1. Effectiveness

The project has achieved the majority of objectives developed at the onset of the project, and in some cases exceeded expectations. This is particularly impressive when considering that some 18 months into the project a programmatic shift occurred to allow greater focus more on national activities in Mali, Niger and Nigeria.

While the establishment of a legal and institutional IAS cooperative framework has not been achieved to date, advances have been made this direction through the development of a draft consultative mechanism and management protocol.³⁵ Moreover, Mali has Ministerial support for the formalisation of this mechanism with a proposed conference in 2009.³⁶

The project has achieved one of its primary goals of developing a common database with pertinent and available information. However, there are marked gaps and shortcomings resulting from the targeted interests of the individual countries and the “data are inadequate to the tasks expected from the IAS project”.³⁷ This remains true today, however, there are plans to continually update the database through coordination of the OSS. Both Mali and Niger are anticipating forwarding additional data to OSS in early 2009.³⁸

The project enhanced technical capacity by enabling national teams to retrieve, collate and analyse bore-hole data. In each country visited lap top computers with software, digitalised maps, GIS, database and hydrological model were viewed.³⁹ Several people from each

³⁵ Annex 4 of OSS (2008i). *Regional Workshop Report - Atelier régional sur le Mécanisme de concertation du Système Aquifère d'Iullemeden (SAI)*, (Workshop on a Regional Consultation Mechanism for IAS), Tunis, 23-26 June, 2008. Sahara and Sahel Observatory, 26 June, 2008.

³⁶ Keïta, M. (2008) Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau. Personal communication 21 November, 2008

³⁷ See p20, OSS (2007b). *A Common Database of the Iullemeden Aquifer System (Bases de Données Commun du Système Aquifère de l'Iullemeden)*. Sahara and Sahel Observatory, Tunis, December, 2007.

³⁸ Maïga, S. (2008) National Focal Point Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique. Personal communication 20-22 November, 2008, Rabé, S. (2008) National Focal Point, Division Chief for Pollution and Water Quality, Ministère de l'Hydrologique, Niger. Personal communication 13 November, 2008

³⁹ Viewed at OSS, in Niger, Nigeria and Mali by Auditor (See Section 4.3 Table 1). Also, p 14, OSS (2008o). *Scientific Report: Management of the Hydrological Risks of the IAS*. Sahara and Sahel Observatory, Tunis, March, 2008.

relevant ministry were trained on database development and modelling in April and November of 2006, and June 2008.⁴⁰ At a minimum, there is one individual in each of the countries who feels comfortable operating the database and conduct modelling and simulations.⁴¹ However, it is generally acknowledged that additional training is needed to develop the capacity of the countries to fully utilize the tools and increased refinement of the database will be needed to advance policy and decision making.

Nevertheless, the database and numerical model, developed through scientific review, provided a tangible focal point to catalyze regional cooperation around the management of the IAS. This was acknowledged throughout the evaluation and at the highest political levels.⁴²

The project has resulted in the creation of a cadre of regional professionals at the technical level who appear committed to continue the work started over the last several years and promote cooperative management of the IAS.

The cooperation that has been initiated to date is likely to have a long-term impact on the hydro-politics of the region. Awareness has been developed at political levels, and regional organisations are increasingly looking at groundwater issues. The ABN, for instance, which previously only dealt with surface waters has recently included groundwater issues to its portfolio.⁴³ Also, neighbouring countries such as Burkina Faso, Benin and Algeria have all expressed an interest in expanding the process.

Table 1 : Level of Achievement of Project Indicators.

Process indicators	Level of Achievement
i. Existence of a jointly prepared and politically accepted Transboundary Diagnostic Analysis, based on the country positions and perceptions, identifying transboundary concerns, risk and uncertainty in the IAS;	Yes -TDA developed and approved. (OSS, 2007a)
ii. Existence of an inclusive and consistent joint basin-wide process of risk identification and policy formulation to address identified risk and implement identified policies, including:	
(a) a common database with capacity for selected, focused modelling of the IAS for identification of transboundary risk issues;	Yes – Database developed and used. (OSS, 2007c)
(b) a joint mechanism at basin level for: (a) Identification of transboundary risk and uncertainty issues; (b) Development of policies to address identified risk issues, (c) A joint development and conservation strategy for the IAS, and (d) Implementation of agreed risk reduction policies.	(a) Yes – TDA process (b) Yes (OSS, 2008g) (c) Partially (d) Partially

⁴⁰ See Section 4.3 Table 1: Project Output Verification.

⁴¹ Bouare, D. (2008) Data base and modelling Expert for IAS Administrateur base SIGMA Centre de Documentation et d'informatique de la DNH, Mali. Personal communication 21 November, 2008, Mukaile, B. (2008) GIS and Modelling Expert for IAS, Hydrological Services Agency, Ministry of Agriculture and Water Resources, Nigeria. Personal communication 19 November, 2008, Rabé, S. (2008) National Focal Point, Division Chief for Pollution and Water Quality, Ministère de l'Hydrologique, Niger. Personal communication 13 November, 2008.

⁴² Chabo, J. (2008) Director of Nigeria Hydrological Service Agency, Ministry of Agriculture and Water. Personal communication 18 November, 2008, Issaka, I. (2008) General Secretary, Ministère de l'Hydrologique, Niger. Personal communication 14 November, Keïta, M. (2008) Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau. Personal communication 21 November, 2008

⁴³ Enoumba, H. C. (2008) Chef Division Etude de Planification, Autorité du Bassin du Niger. Personal communication 14 November, 2008

iii. Existence of a joint legal and institutional Iullemeden cooperative framework, including:	
(a) recognition of opportunities for institutional sustainability and integration with parallel initiatives (NBA, NNOCC) for cross-border land and water management and conservation,	Partially – discussions with ABN, ECOWAS etc.
(b) mechanisms for harmonization of national policies and legislation,	Mostly – through draft protocol. (OSS, 2008i)
(c) a basin organization structure approved and committed for continuing support by the countries and their development partners, and	No – only temporary structure in place.
(d) existence of a transboundary aquifer monitoring system with basin-wide and national components.	Mostly – Temporary structure is functioning
Stress Reduction Indicators	
iv. Transboundary risk and uncertainty issues from land use change, climatic change and extractions and pollution are jointly identified and addressed;	Identified, not addressed. To be addressed under an SAP
v. Development of common agreed policy and management measures for groundwater development and extraction, pollution and salinity control and land use management in the recharge areas and humid zones and outflow sections of the IAS, reflected in a joint development and conservation strategy for the IAS,	Policies identified, but no ‘common policy’ agreed to. (OSS, 2008g)
vi. Existence of a legal cooperative framework and institutional and communication mechanism to address transboundary risk and water conflict,	Informal mechanism for consultation exists. And Draft protocol exists.
vii. Existence of an inter-government communication programme for effective, timely contact and consultation between national water resources institutions	Mostly, the Inter-governmental tool has been developed and agreed to. (OSS, 2008d)
Environmental Status Indicators	
viii. Jointly adopted environmental goals and criteria identified in a joint Transboundary Diagnostic Analysis, including quantitative and qualitative indicators upon which priority actions can be identified and implemented,	TDA does not list adopted goals and indicators, this is partially covered in the Policy Elements document. (OSS, 2008g)
ix. Land use change in recharge areas and humid zones with transboundary risk of adverse environmental impacts on the IAS, jointly monitored and managed,	Joint monitoring is occurring through the update and sharing of the database.
x. Actual and planned groundwater abstractions and pollution pressures and salinization hazard are jointly monitored for transboundary risk and adverse environmental impacts on the IAS,	Joint monitoring is occurring through the update and sharing of the database.
xi. National governments and local communities are involved in the management of transboundary risk and uncertainty related to the IAS,	National programs to date focus on monitoring and awareness building.
xii. Existence of a pilot project in the perspective of scaling up to a global aquifer focal area for information sharing across GEF- IW	The IAS project itself has served this purpose to date.

projects.

Experiences have been shared by the GEF IW community.⁴⁴

Both the complexity and magnitude of the tasks are accounted for when assessing the overall effectiveness of the project. While several of the project indicators remain only partially achieved, the project was effective at meeting its overall objectives to:

1. establish joint mechanisms and capacity to identify risk and uncertainty issues in the IAS related to:
 - a. land use change in recharge areas and humid zones,
 - b. climate change with reduced net precipitation, and
 - c. inappropriate development, extraction and surface based water pollution and salinization
2. establish mechanisms to formulate policies for management of identified risk and uncertainty issues, and
3. establish a legal and institutional IAS cooperative framework.

The Effectiveness of obtaining the main project objectives: Satisfactory

4.1.2. Relevance

The project objectives are consistent with GEF Strategic Priorities under the International Waters portfolio.⁴⁵ It directly addresses “Undertaking Innovative Demonstrations for Reducing Contaminants and Addressing Water Scarcity and Competing Water Uses” (SP 3). The IAS project is one of a handful of international projects dealing with Transboundary groundwater issues⁴⁶ and only the second to use modelling tools to illustrate the need for cooperative management.

In terms of SP-2, “Expand Global Foundational Capacity Building and Support for Targeted Learning”, the project has enhanced the ability of national teams to retrieve bore-hole data and information, manipulate databases and modelling tools; and develop coherent monitoring programs. The development of broader level policy documents⁴⁷ and draft consultative protocol will help pave the way towards an articulate SAP and hopefully future investment partnerships for the mitigation of risks to the IAS, corresponding to SP-1.

The Relevance of the project to GEF priorities: Highly Satisfactory

⁴⁴ DGEF (2009) *Comments on Draft Report of TE submitted December 2008*. UNEP Task Manager comments as received by email on January 14, 2009.

⁴⁵ See (www.gefweb.org/Projects/focal_areas/iw/iw_ops.html).

⁴⁶ Others include the Guarani, Northwest Saharan, and Nubian aquifers.

⁴⁷ OSS (2008f). *Policy elements for transboundary risks reduction of the Iullemeden Aquifer System (IAS)*. Managing Hydrological Risk in the Iullemeden Aquifer System, Sahara and Sahel Observatory, March, 2008

4.1.3. Efficiency

The overall project budget was \$1,738,200 (GEF 958,000 and co-funding 780,000). Additional funding from CIDA for €150,151 (US\$ 220,000) and from national governments in-kind contribution of US\$161,500 brought the overall costs to approximately US\$ 2,119,700.

A similar project “The Protection of the North West Sahara Aquifer System (NWSAS) and related humid zones and ecosystems” developed a database, model and consultation mechanism for aquifer information. It was conducted for \$1, 416,000 (GEF \$600,000 and co-financing \$816,000).

Delays: The project took approximately 18 months to develop the relationships with the technical partnerships, create national committees, move the Project Coordinator from Niamey to OSS offices in Tunis, and develop a ‘New Orientation’ (See Project Background Section 2.2). It was further extended an additional 18 months, from January 2007 to June 2008.

The initial delays clearly set everything back by approximately 18 months, however the project proponents were able to complete the majority of their objectives within the agreed budget. Development of risk reduction policies and joint development and conservation strategy were never fully developed, as projected for months 18-26; however, policy elements for risk reduction were developed at a 2 day workshop in March 2008.⁴⁸

Building on other initiatives:

The project built on the project management, facilitation, modelling and tool development expertise of the OSS developed during the Northwest Saharan Aquifer System Project.

The project also relied on the information and knowledge of the local country ministries, universities, and other organisations both international and regional such as ESA, UNESCO, ABN, AGRHYMET.⁴⁹

The Efficiency of the project to meet objectives: Moderately Satisfactory

⁴⁸ OSS (2008f). *Policy elements for transboundary risks reduction of the Iullemeden Aquifer System (IAS)*. Managing Hydrological Risk in the Iullemeden Aquifer System, Sahara and Sahel Observatory, March, 2008

⁴⁹ (OSS (2007b). *A Common Database of the Iullemeden Aquifer System (Bases de Données Commun du Système Aquifère de l'Iullumeden)*. Sahara and Sahel Observatory, Tunis, December, 2007)

4.2 B: Sustainability

4.2.1. Financial resources.

The current investment has laid the initial ground for an SAP to help develop investment opportunities in the future. The relevant ministries while enthusiastic to continue fieldwork and augmentation of the knowledge base, may not have sufficient funds to undertake the necessary work. In the case of Nigeria, the central government has initiated a national 'Hydrological Mapping of Nigeria' program which includes both surface and groundwaters; however the Sokoto region (which corresponds to the IAS) is only one of many regions in the country and is not a priority.⁵⁰

Niger is interested to continue the project and has made available some financial support from the Ministry for increased data and information monitoring. They have installed some 19 data loggers in the field are ready to have local staff in the districts take charge of them.⁵¹ It is unlikely, however, that extensive fieldwork or new pilot areas will be developed without additional support.

Mali appears committed to devote financial resources for the continuation of the project, to the extent that it is willing to host the ministers meeting to advance a consultative mechanism for the IAS.⁵² They received data loggers from IAEA in 2003; however, they are not operational as they have never been trained in their use.⁵³ Nevertheless, Mali provided budget alterations for the eastern regions to support data gathering for the IAS, and in 2008 created the CDMT (Cadre de Dépense à Moins Termes) with the World Bank for investment in water related projects.⁵⁴

At this stage there appears to be no private sector investment, and modest support from the national public sector. While the benefits of the current project will continue, in terms of awareness and cooperation building, further assistance is needed for several years to enhance capacity and maintain momentum in activities to have a lasting impact on policy development.

In assessing the financial sustainability consideration has been given to the fact that the project was groundbreaking in terms of political awareness regarding groundwater issues, and that in such a short period of time it is unlikely that there would be complete financial sustainability.

Financial Sustainability: Moderately Likely

⁵⁰ Mukaile, B. (2008) GIS and Modelling Expert for IAS, Hydrological Services Agency, Ministry of Agriculture and Water Resources, Nigeria. Personal communication 19 November, 2008

⁵¹ Issaka, I. (2008) General Secretary, Ministère de l'Hydrologique, Niger. Personal communication 14 November

⁵² Keïta, M. (2008) Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau. Personal communication 21 November, 2008

⁵³ Maïga, S. (2008) National Focal Point Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique. Personal communication 20-22 November, 2008

⁵⁴ Traoré, K. (2008) Project Director, Rual Water, Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique, Mali. Personal communication 22 November, 2008

4.2.2. Socio-political:

There are no apparent social or political risks that may jeopardize the sustenance of project outcomes. All indications suggest that national governments are keen to continue to work towards greater understanding or and cooperation around the use of groundwater in the IAS, and that it is in their long term interests to do so. As one senior official pointed out “there are no conflicts over groundwater use at the moment, and we are intending to keep it that way [by continuing the IAS project]”.⁵⁵ The awareness of how important the continued benefits of the project is evidenced by the letters of support, at the ministerial level, for the continuation of the IAS project (Annex D).

Socio Political Sustainability: Likely

4.2.3. Institutional framework and governance.

In terms of data and information exchange to update and integrate new bore-hole and water point information into the database for model development, the current situation will function well in the short-term (2-3 years). The current structure has OSS as the focal point where the database and model are principally housed and run. National Focal Points are to send data to OSS for quality control and updating and will receive an updated database on an annual basis, or as often as needed.⁵⁶ Currently, there is no single institution in the region with the experience to perform quality control checks on submitted data that has been charged with housing the database. It is envisaged that handing over responsibility for these tasks will be a priority in a second phase of the program.⁵⁷

Key to the ongoing success of the program will be identifying a regional institution which will be able to take over the role that OSS currently plays, not only in terms of technical oversight, but also facilitation and administrative oversight. Discussions have ranged from an existing institution such as ABN, ECOWAS, to the creation of an entirely new entity dedicated to groundwater management.⁵⁸ During the final evaluation of possible institutional frameworks an assessment of transparency and financial management will be needed. This will be in addition to a set of clear evaluation criteria agreed by all stakeholders (See Section 6 Recommendations).

Institutional Framework Sustainability: Moderately Likely

⁵⁵ Keïta, M. (2008) Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau. Personal communication 21 November, 2008

⁵⁶ Ould Baba Sy, M. (2008) Hydrogeologist and modeller, IAS Project, OSS. Personal communication 10-12 November

⁵⁷ Nakamura, T. (2008) UNEP/GEF International Waters SPO. Personal communication 27 November, 2008; OSS (2008a). *Integrated Management of the Water Resources of the Iullemeden Aquifer Systems, the Taoudeni and River Niger: Identification Document of the Project*. Sahara and Sahel Observatory, Tunis, April, 2008

⁵⁸ OSS (2008i). *Regional Workshop Report - Atelier régional sur le Mécanisme de concertation du Système Aquifère d'Iullemeden (SAI), (Workshop on a Regional Consultation Mechanisim for IAS), Tunis, 23-26 June, 2008*. Sahara and Sahel Observatory, 26 June, 2008

4.2.4. Environmental.

It is beyond the scope of this report to give a detailed assessment of the major environmental risks which could undermine the future benefits of the project. However, a cursory review suggests the principle environmental risks are those which the project seeks to directly address, namely:

1. increasing extraction of groundwater beyond a sustainable level
2. potential pollution of near surface aquifers, or increased reliance on deeper more mineralised aquifers; and
3. alteration in precipitation patterns due to climate alterations.

While climate change will likely exacerbate the situation⁵⁹ and negative trends seen, increasing demand and extraction appears to be the most precarious problem. This is consistent with the findings of studies comparing the effects of climate change with increased demand.⁶⁰ There already exists both physical and anecdotal evidence of groundwater table decline in all countries.⁶¹ Analysis of data from the project shows that some aquifers have declined as much as 60m over the last 35 years.⁶²

Environmental Sustainability: Moderately Likely

⁵⁹ Modelling has shown that the Sahel region of West Africa will likely experience less runoff and precipitation in the next 25 years. See Arnell, N. (2003). Effects of IPCC SRES emissions scenarios on river runoff: a global perspective. *Hydrology and Earth Sciences*. 7 (5):619-641.

⁶⁰ Vörösmarty, C., P. Green, J. Salisbury and R. Lammers (2000). Global Water Resources: Vulnerability from Climate Change and Population Growth. *Science*. 289 (5477):284-288

⁶¹ Chabo, J. (2008) Director of Nigeria Hydrological Service Agency, Ministry of Agriculture and Water. Personal communication 18 November, 2008, Maïga, S. (2008) National Focal Point Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique. Personal communication 20-22 November, 2008, Rabé, S. (2008) National Focal Point, Division Chief for Pollution and Water Quality, Ministère de l'Hydrologique, Niger. Personal communication 13 November, 2008

⁶² Page 10-11 OSS (2008o). *Scientific Report: Management of the Hydrological Risks of the IAS*. Sahara and Sahel Observatory, Tunis, March, 2008

4.3 C: Achievement of outputs and activities

Figure 2 (Section 2) above shows the relationship between the initial project outputs and components, the revised set following the ‘New Orientation’, and the actual outputs. Table 2, Project Output and Verification, details the major project outputs as conceived at the onset of the project (A)⁶³ and as reframed under the ‘New Orientation’(WP).⁶⁴ The main project outputs at the project inception were:

Component 1: Identification of Transboundary Risks

1.1 Trans-diagnostic Analysis (TDA).

The TDA was developed in March 2007 and approved at a regional workshop in February 2008 (see 1.1(b) Table 2). The TDA identifies and sets priorities for the major environmental problems with a transboundary characteristics and identifies their immediate causes.

While the TDA is an excellent first step at collating the various environmental and socio-economic issues surrounding the IAS, at its current level of development, it “does not equip the countries with elements to help better plan the use of common water resources”.⁶⁵ However, the TDA is an iterative document and will require periodic updating as information is obtained and situations change. It can provide a solid foundation for developing an SAP for the basin.

1.2 Modelling and Capacity Building

A numerical hydrogeological model of the aquifer systems was developed, 3 training sessions were conducted on the use of the database and model, equipment was purchased and software installed and provided to each relevant ministry (See 1.2 (a) and (b), Table 2). It is acknowledged that while there is at a minimum one individual in each country that can run the models more training is needed for the ministries to be considered fully functional (See Section 4.1). While the model will require refinement, it is an excellent first step to develop a planning tool for policy development.

The model uses the Processing Modflow 5 software and is based on two main aquifer systems: the Continental Intercalaire and Continental Terminal. The model was calibrated using control points of known value over time. It provides for calculations of piezometric levels, transmissivity, recharge (in flow), extractions and outflow, and other hydrodynamic parameters. After verification and calibration, initial simulations have been conducted on piezometric levels up to 2025 and have assisted in highlighting vulnerable zones, such as along the boarder between Niger and Nigeria.

1.3 Field Studies of Aquifer Recharge

The field studies anticipated to be carried out by IRD were not conducted. Instead, IRD carried out analysis of existing data and the national ministries themselves conducted extensive collection and collation of existing data in the field and district offices (See Program Activities, Section 2.2).

⁶³ GEF (2003a). Project Brief: Managing Hydrological Risk in the Iullemeden Aquifer System, March 2003. retrieved 10 November, 2008 from http://www.gefweb.org/Documents/Medium-Sized_Project_Proposals/MSP_Proposals/Regional_-_Iullemeden_Aquifer_System.pdf

⁶⁴ OSS (2005d). *New Orientation*. Sahara and Sahel Observatory, Tunis, June, 2005

⁶⁵ OSS (2008o). *Scientific Report: Management of the Hydrological Risks of the IAS*. Sahara and Sahel Observatory, Tunis, March, 2008

1.4 (a) Establishment of a Common Risk Identification Database and (b) Targeted Pilot Area Surveys

- (a) The database which was anticipated to be developed by AGRHYMET in conjunction with IAEA was not developed (See Program Activities, Section 2.2). Nevertheless, OSS took the lead to establish a database of bore-hole and water point information from which to develop the hydrogeological model (See 1.4 (a) Table 2). The database also included digitized topographic and geological maps, land use, land cover, rainfall, evaporation, evapotranspiration, water balance, dynamic of surface water, and Digital Elevation Model which were not initially envisioned (1.5 and 1.6, Table 2).

The data collected within the limits of the system were processed, analysed, harmonized and filed in the database. The data focuses on capturing the Continental Intercalaire and Continental Terminal aquifers as well as the rainfall, hydrometric, piezometric, chemical, geological records and abstractions, amongst others. There are more than 36 parameters for each bore-hole listing.

The database includes around 17 200 inventoried water points, with: 740 in Mali (4%), 16 170 in Niger (94%) and 300 in Nigeria (2%).

The IAS Geographic Information System (GIS) is linked to the common database, and is used for processing and analysis of data as well development of maps. For example the evolution maps of the number of water sources, of piezometric levels, of transmissivity, as well as geological cross sections.

- (b) Countries submitted reports of isotope studies conducted by the IAEA.⁶⁶ In the case of Niger some 19 data loggers were installed.⁶⁷ Mali received 10 data loggers from IAEA in 2003, but as yet have not installed them as they are awaiting training.⁶⁸ Nigeria has not been able to conduct as much fieldwork as it would like due to funding restrictions, however, it hopes to have some additional field data by mid 2009.⁶⁹

Component 2: Policy and Institutional Mechanisms for Reducing Transboundary Risk

2.1 Establishment of Mechanisms for Formulation of Risk Reduction Policies and a Joint Development and Conservation Strategy for the IAS

The project produced a Policy Elements document following a two day workshop, in which countries presented their national policies (See 2.1(b), Table 2). The Policy Elements document covers a large range of background in hydrology, socio-economic issues and legal issues as they pertain to groundwater use. Many potential actions are listed as possible solutions and warrant further attention. The paper however falls short of developing a strategy in terms of actions, timelines and outputs.

2.2 Development of a Joint Legal and Institutional IAS Cooperative Framework

⁶⁶ Confirmed by National Focal Points and by OSS.

⁶⁷ Issaka, I. (2008) General Secretary, Ministère de l'Hydrologique, Niger. Personal communication 14 November

⁶⁸ Maïga, S. (2008) National Focal Point Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique. Personal communication 20-22 November, 2008

⁶⁹ Chabo, J. (2008) Director of Nigeria Hydrological Service Agency, Ministry of Agriculture and Water. Personal communication 18 November, 2008

Through work with the FAO, the project analysed the legal structures in each country and developed a general policy document putting forward several possible structures for the consultative mechanism in October 2006 (2.2 (a) and (b), Table 2). The countries requested additional assistance from the FAO and UNEP to formalise a mechanism (Annex D). They developed a draft protocol for the consultation mechanisms to manage the IAS in June 2008 (2.2 (c), Table 2). This is a very advanced document outlining management roles and responsibilities for various ministerial committees, technical committees and secretariat. It was spearheaded by Niger and based on existing documents such as the Niger Basin Water Charter of the ABN.⁷⁰

While a formalised legal and institutional framework was not developed, great advancement was made towards this end during the project. Moreover, a functioning institutional mechanism for data and information exchange is operational, with OSS as a facilitator and focal point.

2.3 Mechanisms for Transboundary Aquifer Monitoring

Guidelines for monitoring in the IAS was produced by OSS and approved of at a regional workshop in Niamey, 8-9 February, 2008 (2.3 in Table 2) Though the document was never actually viewed, it was confirmed by several people, including the National Focal Points.

Component 3: Awareness, Participation, Communication

3.1 Common Public Awareness Program

Based on a consultants report, the *Participatory Management* document was adopted (with revisions) following a Regional Workshop (28-29 March, 2008) (3.1, Table 2). It outlines the technical and scientific information, gives an overview of the socio-economic situation in various sectors (including forestry and mining), briefly discusses water use and conflict, and lists various possible mechanisms for building awareness depending on user groups. It is an excellent source document for developing public awareness and participation, however stops short being a strategy document for a program. There are no programs of action, timeframe, amongst others.

3.2 Inter-governmental Communications Tools

At a two day workshop (12-14 March, 2008), a report on *Inter-governmental Communication Tool* was approved (3.1(b), Table 2). This report focuses on building awareness at political and technical levels, and the practical nature of data and information exchange between the three project countries and OSS. It supports the development of the Tirpartate Consultative Mechanism by elaborating practicalities of information exchange.

The report also reviews the areas where information is held in the various countries, discusses the mode in which the information is held (for example in Lotus 123 etc.); discusses capacity or human resource needs for continued exchange of information; and outlines a potential organizational structure for information exchange (with OSS as the data repository).

Summary

⁷⁰ Kiari, K. N. (2008) Directeur de la Législation, Ministère de l'Hydraulique, Niamey, Niger. Personal communication 17 November, 2008; ABN (2008). *La Charte de l'Eau du Bassin du Niger*. Niamey, 30 April, 2008

It is difficult to assess the achievements of the project in a single rating. Some of the projected outputs were not achieved, such as recharge field studies; some were developed, though were perhaps less than anticipated, such as the Program for Common Awareness; others resulted in the development of tools which exceeded initial expectations, such as the database and hydrogeological model.

The outputs of the project, on the whole, appear above average for a project of this size and complexity.

Achievement of outputs: Satisfactory

Table 2: Project output verification.

A ⁷¹	WP ⁷²	Expected outputs	Outputs generated	Verification
1	10000	Component 1: /Identification of Transboundary risk (Development of Transdiagnostic Analysis)		
1.1(a)	11000 12000	Minutes of the inter-ministerial committee meetings, and country input	Reports of the Inter-ministerial committees meetings (Mali, Niger, Nigeria). Numerous reports of National Scientific Committees	<ol style="list-style-type: none"> 1 <i>National Workshop Report: Transboundary Diagnostic Analysis and Consultation Mechanism on the GEF/UNEP 'Managing Transboundary Hydrological Risks in the IAS, Abuja 6-8 February, 2006. Sahara and Sahel Observatory, February, 2006 (OSS, 2006b).</i> 2 <i>National Workshop: Increased Development of a TDA and Consultation Mechanism, Abuja, 18-20 December, 2006. Sahara and Sahel Observatory, Tunis, 29 December, 2006 (OSS, 2006d).</i> 3 <i>National Workshop Report: Development of TDA and Consultation Mechanism, Niamey, 14-15 February, 2008. Sahara and Sahel Observatory, Tunis, 15 February, 2008 (OSS, 2006c)</i> 4 Numerous reports of National Scientific Committees.
1.1(b)	13000 14000	Report of the final TDA workshop	<ol style="list-style-type: none"> 1 Report of final TDA 2 Report presented and approved during regional workshop (Niamey, Feb. 08) 	<ol style="list-style-type: none"> 1 <i>Transdiagnostic Anaysis of the Iullemeden Aquifer System Tunis, March, 2007. (OSS, 2007a)</i> 2 <i>Regional Workshop Report: Validation of the TDA for IAS, Niamey, Niger, 6-7 February, 2008. Sahara and Sahel Observatory, Tunis, 13 February, 2008 (OSS, 2008l).</i>
	2000	Reinforcing the state of knowledge		
1.2(a)	24000	Computer models with operational guidelines	<ol style="list-style-type: none"> 1 Model: PM5 developed for IAS in OSS headquarter and operational for countries 2 Final report on IAS Model: Dec 2007 	<ol style="list-style-type: none"> 1 PM5 model for IAS viewed at OSS offices, 10-11 November 2008. 2 <i>Hydrogeological Model of the Iullemeden Aquifer System. Sahara and Sahel Observatory, Tunis, December, 2007</i>

⁷¹ A corresponds to the workplan of the original project document and listed under the terminal report.

⁷² WP relates to the Work Plan # associated with the New Orientation (OSS (2005d). *New Orientation*. Sahara and Sahel Observatory, Tunis, June, 2005).

A ⁷¹	WP ⁷²	Expected outputs	Outputs generated	Verification
				(OSS, 2007c)
1.2(b)	24100	Reports of training on the models	1 Training sessions on management tools (Database, GIS, model) organized in OSS	1 Regional Training Workshops 1.a <i>Regional Workshop: Training for Capacity Building for Mathematical Modelling, Tunis, 18-29 April, 2006.</i> Sahara and Sahel Observatory, Tunis, 29 April, 2006 (OSS, 2006g) 1.b <i>Regional Workshop: Training for Capacity Building for Mathematical Modelling of IAS, Tunis, 29 November-8 December, 2006.</i> Sahara and Sahel Observatory, Tunis, 11 December, 2006 (OSS, 2006f) 1.c <i>Regional Workshop: Training of Trainers for Database, GIS and Model, Tunis 18-27 June, 2008.</i> Sahara and Sahel Observatory, Tunis, 12 July, 2008 (OSS, 2008n)
1.3	22000	Report of the field surveys and institutional set-ups and training	1 The field surveys changed to data collection filed by countries and not by IRD to strengthen IAS knowledge mainly during training sessions	1 Field surveys exchanged during training sessions.
1.4 (a)	21000 23000	Data table contained in the database and reports of training	- IAEA database elaborated by AGRHYMET not available and then operational to the project. OSS elaborated IAS database - Three reports of training sessions: April 2006, Nov-Dec 2006 and June 2008. - Final report: Database & GIS, Dec 2007	<i>A Common Database of the Iullemeden Aquifer System (Bases de Données Commun du Système Aquifère de l'Iullemeden).</i> Sahara and Sahel Observatory, Tunis, December, 2007 (OSS, 2007b). Viewed at OSS offices, and in Niger, Mali and Nigeria.
1.4 (b)	22300	Reports of the isotope studies	IAEA worked in independent manner. Reports of the isotopes studies obtained by the countries not by IAEA	Confirmed by OSS and National Focal Points
1.4 (b)	23300	Reports of the pilot area studies	Reports of the isotopes studies obtained by countries not by IAEA. Scientific equipments installed in the countries (automatic recorders)	Confirmed by OSS and National Focal Points
1.5.	22300	Topographical and Geological digitalised	Two digitalised maps : Topography and Geology	Viewed as part of the IAS model housed in OSS.

A ⁷¹	WP ⁷²	Expected outputs	Outputs generated	Verification
		maps		
1.6.	23400	Outputs from Remote sensing	Maps of land use, land cover, rainfall, evaporation, evapotranspiration, water balance, dynamic of surface water, Digital Elevation Model	Viewed as part of the IAS model housed in OSS.
2	3000	Component 2: Policy Mechanisms for Management of Transboundary Risk (Formulation of Political and Institutional Framework)		
2.1a	31100	Reports of the Policy development committees	Reports of national expertises	Not viewed. Mentioned in workshop report.
2.1b		IAS policy and strategy	Report obtained during regional write-shop	<ol style="list-style-type: none"> 1 <i>Workshop Report: Policy Elements for the Reduction of Tranboundary Risks in the IAS, Tunis, 24-28 March, 2008.</i> Sahara and Sahel Observatory, Tunis, 2 March, 2008 (OSS, 2008k) 2 <i>Policy elements for transboundary risks reduction of the Iullemeden Aquifer System (IAS). Managing Hydrological Risk in the Iullemeden Aquifer System, Sahara and Sahel Observatory, March, 2008 (OSS, 2008g)</i>
2.2a	32000	Policy options assessment report	<ol style="list-style-type: none"> 1 Reports done by each country 2 Policy options assessment report done by FAO experts : Review and assessment of existing national legal and other documents 	<ol style="list-style-type: none"> 1 Reports referred to in final FAO consultant report. 2 <i>Preliminary Proposals for a Consultative Mechanism for the IAS, TCP/RAF/3001.</i> By Marcella Nanni, United Nations Food and Agriculture Organization, Rome, August, 2005 (FAO, 2005)
2.2b	32100 32200	Reports of the review committees	<ol style="list-style-type: none"> 1. FAO mission and national level meetings (conducted in 2005, prior to regional workshop in June, 2005) 2. Reports of the review done during regional workshops (Niamey, June 2005, and Roma, October 2006) 3. Review and improvement of the documents in a validation workshop at the national level 4. Review and improvement into a common final draft document (Regional workshop, Roma, 	<ol style="list-style-type: none"> 1 Mission Reports (OSS, 2005a, 2005c, 2005b) 2 <i>Workshop Report: Development of Tripartate Consultation Mechanism for the IAS, Niamey, 29 June-1 July, 2005.</i> Sahara and Sahel Observatory, Niamey, (Date submitted?)(OSS, 2005e) 3 National workshops <ol style="list-style-type: none"> 3.a <i>Report of the National Workshop on Transboundary Diagnostic Analysis and Consultation Mechanism on the GEF/UNEP 'Managing Transboundary Hydrological Risks in the IAS' 6-8 February, 2006 Abuja, Nigeria</i>

A ⁷¹	WP ⁷²	Expected outputs	Outputs generated	Verification
			October 2006)	(OSS, 2006b) 3.b <i>National Workshop on Consultation Mechanism, Niamey, Niger, 14-15 February, 2005 (only mentioned in FAO, 2006 and)</i> 3.c <i>National Workshop on Consultation Mechanism, Bamako, Mali, 20-22 June, 2006 (only mentioned in FAO, 2006)</i> 4 <i>Discussion Document: Mise en place d'un mécanisme tripartite de concertation pour la gestion du Système aquifère d'Iullemeden (SAI) (A Tripartite Consultation Mechanism for Management of the IAS), TCP/RAF/3001, Rome, 19-20 October, 2006. United Nations Food and Agriculture Organization, Rome, September, 2008 (FAO, 2006)</i>
2.2c	42000 42300	Adopted legal agreement	1. Countries adopted the structure and the draft-Agreement of the tripartite consultative mechanism (Regional workshop, Roma, October 2006) 2. Countries updated the Draft-Agreement to its adoption during Ministries meeting (Regional Workshop, Tunis, June 2008)	1. Countries approved the basic consultative mechanism structures as developed in Rome (October, 2006) 2. Draft text developed. Annex 4 of <i>Workshop Report - Atelier régional sur le Mécanisme de concertation du Système Aquifère d'Iullemeden (SAI), (Workshop on a Regional Consultation Mechanism for IAS), Tunis, 23-26 June, 2008. Sahara and Sahel Observatory, 26 June, 2008 (OSS, 2008i)</i>
2.2d	32000	Report of the final inter-governmental meeting	Report done by FAO	Not seen.
2.3a		Proposal for IAS monitoring system	1 Workshop to validate monitoring guide. 2 Guidelines for monitoring IAS done by OSS	1 <i>Regional Workshop: Monitoring Transboundary Aquifers of the IAS, Niamey, 8-9 February, 2008. Sahara and Sahel Observatory, Tunis, 13 February, 2008 (OSS, 2008m)</i> 2 OSS (2007g). <i>Monitoring transboundary aquifers: Guidelines. Observatoire du Sahara et du Sahel, December, 2007.</i>
2.3b		Report of the pilot monitoring activities	Only Niger had established the equipment in the pilot area for monitoring transboundary aquifers	Reports confirmed by Mr. Sanoussi Rabé (Ministère de l'Hydrologique, Niger, (Rabé, 2008).

A ⁷¹	WP ⁷²	Expected outputs	Outputs generated	Verification
			(Continental Terminal) Niger report done and sent to IAEA	
3	4000	Component 3: Awareness, Participation and Communication (Awareness, Participation and Capacity Building)		
3.1 a	41000	Joint program for awareness building	<ol style="list-style-type: none"> 1. Workshop to validate consultant report 2. Report on participatory management 	<ol style="list-style-type: none"> 1. <i>Regional Workshop Report: la gestion participative des risques transfrontaliers du SAI (Participative management of transboundary risks in IAS), Tunis, 28-29 March, 2008. Sahara and Sahel Observatory, Tunis, 2 March, 2008 (OSS, 2008j)</i> 2. <i>Participatory Management of Transboundary Risks. Managing Hydrological Risk in the Iullemeden Aquifer System, Sahara and Sahel Observatory, Tunis, April, 2008 (OSS, 2008e).</i>
3.1a	41100	Reports of stakeholder consultation meetings	Regional report of awareness and participation on risks management	As above
3.1a	41100	Awareness raising materials	See regional report	As above
3.1b	41100	Stakeholder assessment report	See regional report	As above
3.2a	42200	Report of training session on inter-governmental communication tools	<ol style="list-style-type: none"> 1 Iullemeden website built. 2 Training session done by OSS during regional workshop (March 2008) 	<ol style="list-style-type: none"> 1 URL: http://iullemeden.iwlearn.org 2
3.2b	42200	Intergovernmental communication tools	<ol style="list-style-type: none"> 1 Workshop on Communication tools (March, 2008). 2 Report on practical methods and an organizational structure for continued information exchange. 	<ol style="list-style-type: none"> 1 <i>Regional Workshop Report: Communication Tools between Countries, 12-14 March. Sahara and Sahel Observatory, Tunis, 2 March, 2008 (OSS, 2008p).</i> 2 <i>Outils de Communication entre les Pays du Système Aquifère d'Iullemeden SAI (Communication Tools between Countries of Iullemeden Aquifer System).</i> Sahara

A ⁷¹	WP ⁷²	Expected outputs	Outputs generated	Verification
				and Sahel Observatory, Tunis, April, 2008 (OSS, 2008d)
4	5000	Component 4: Monitoring, Evaluation and Dissemination of Data		
4.1a	51000	Report of mid-term review	see UNEP (2006). Midterm review was not conducted as planned.	Mid term review conducted between UNEP and OSS resulting in a proposal for the “New Orientation” (DGEF, 2009)
4.1b	51000	Report of the terminal evaluation	Not yet	
	51000	Annual reporting (PIR)	There were three annual PIR reports during the course of the project in 2006, 2007, 2008	<ol style="list-style-type: none"> 1. <i>PIR (1 July, 2005-30 June, 2006)</i>. Sahara and Sahel Observatory, Tunis, June, 2006 (OSS, 2006e) 2. <i>PIR (1 July, 2006-30 June, 2007)</i>. Sahara and Sahel Observatory, Tunis, June, 2007 (OSS, 2007d) 3. <i>PIR (1 July, 2007-30 June, 2008)</i>. Sahara and Sahel Observatoy, Tunis, June, 2008 OSS, 2008f)
	51000 53000	Progress Reports	Progress reports for 2006, 2007 and 2008	<ol style="list-style-type: none"> 1. <i>Progress Report: 1 July - 31 December, 2007</i>, (OSS, 2007f) 2. <i>Progress Report: 1 January - 30 June, 2007</i>. June, 2007 (OSS, 2007e) 3. <i>Progress Report: 1 January-30 June, 2008</i>. June, 2008 (OSS, 2008h)
4.2a		Report of ISARM reference information	No information from UNESCO/ISARM	
4.2b		Report of the strengthening of aquifer knowledge	Scientific report and activities to advance TDA and consultative mechanism.	<i>Scientific Supervision, Diagnostic Supervision Report</i> . UNESCO, February, 2006 (UNESCO, 2006) <i>DRAFT: Appraisal of GEF-IW MSP Managing Hydrogeological Risk in the Iullemeden Aduifer System (IAS)</i> . UNESCO, October, 2008 (UNESCO, 2008).
4.3		Report of data provision to global database	Not completed as of November, 2008	
5		Component 5: Project Management		
5.1	52000	PSC meetings and	Done.	First Steering Committee Meeting, Paris, February 2004. (No

A ⁷¹	WP ⁷²	Expected outputs	Outputs generated	Verification
		reports	In the beginning (Feb. 2004), mid-term (Feb. 2006), and the end of the project (May 2008)	direct documentation seen, but referred to in various reports). <i>Steering Committee Report: Meeting of the Steering Committee of the GEF/UNEP Assisted Project 'Managing Hydrological Risks in the Iullemeden Aquifer System' of Mali, Niger and Nigeria; Abuja, 25-26 February, 2006. Abuja, February, 2006 (OSS, 2006j)</i> <i>Mission Report: Regional Steering and Scientific Steering Committee Meetings, Bamako, 4-12, May, 2008. Sahara and Sahel Observatory, Tunis, 14 May, 2008 (OSS, 2008c)</i>
5.2	54000	Scientific Coordinating Committee meeting reports, national level	1 Report in the mid-term (Feb. 2006) and 2 The end of the project (May 2008)	1 Report of Abuja Meeting in Feb, 2006. 2 <i>National Mission Reports</i> 2.a <i>Mission Report: Regional Steering and Scientific Steering Committee Meetings, Bamako, 4-12, May, 2008. Sahara and Sahel Observatory, Tunis, 14 May, 2008 (OSS, 2008c)</i>
		Final Project Meeting with UNEP	Final Project Meeting with UNEP to validate project, review accounting, and discuss future steps.	<i>Mission Report: Final Project Meetings with UNEP, and initial discussions for Phase II, Nairobi, 18-25 May, 2008. Sahara and Sahel Observatory, Tunis, 24 May, 2008 (OSS, 2008b)</i>

4.4 D: Catalytic Role

The project has had a catalytic effect in terms of:

- Scaling up efforts in the region through the promotion of a second phase, which is to include the Taudeni-Tanezouft aquifer systems which includes Algeria, Mauritania and Burkina Faso.⁷³
- The ABN has developed an interest in groundwater resources as part of its 'integrated water management programme'.⁷⁴
- Generating interest in the IAS process at international meetings such as the 4th World Water Forum, Mexico City, March 16-22, 2006. The project was presented as workshops organized under the IWLEARN project. This carried a strong catalytic effect since many of the other groundwater projects wanted to see the IAS case, since the IAS project carried out the TDA for a shared groundwater aquifer system for the first time.⁷⁵
- Replication of the process in the region. Mali is looking to replicate the process used to develop cooperation under the IAS program to other aquifers it shares such as in the region of Le Fosse de Naras, which are shared aquifers with Mauritania; and the Plan de Gondo aquifers, which are shared with Burkina Faso.⁷⁶
- At a national level, academics in Mali are developing university courses in groundwater modelling to build future capacity and capability, and looking to use the tools for national issues.⁷⁷

Catalytic Role: Satisfactory

⁷³ OSS (2008a). *Integrated Management of the Water Resources of the Iullemeden Aquifer Systems, the Taoudeni and River Niger: Identification Document of the Project*. Sahara and Sahel Observatory, Tunis, April, 2008

⁷⁴ Enoumba, H. C. (2008) Chef Division Etude de Planification, Autorité du Bassin du Niger. Personal communication 14 November, 2008

⁷⁵ DGEF (2009) *Comments on Draft Report of TE submitted December 2008*. UNEP Task Manager comments as received by email on January 14, 2009.

⁷⁶ Traoré, K. (2008) Project Director, Rual Water, Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique, Mali. Personal communication 22 November, 2008

⁷⁷ Traore, A. Z. (2008) Director of UFAE, Professor at Ecole National des Ingénieurs, Mali. Personal communication 21 November, 2008

4.5 E. Assessment of Monitoring and Evaluation Systems.

4.5.1. M&E design

The monitoring and evaluation program as laid out in Annex 27 of the official GEF Project Document: Managing Hydrogeological Risk in the Iullemeden Aquifer System⁷⁸ is comprehensive including:

- i. methodology and reporting requirements, detailed roles and responsibilities,
- ii. organizational structure and relationships
- iii. monitoring of impacts and outcomes
- iv. monitoring of outputs, time frame for activities and reporting requirements (Annex E).
- v. monitoring of stakeholder participation
- vi. monitoring of financial disbursements and expenditure
- vii. Monitoring of partnerships
- viii. Monitoring of building sustainability and replicability
- ix. Evaluation plan, including annual self evaluations as well as external evaluations.

Indicators: The indicators for the project were separated into Process, Stress Reduction, and Environmental Status indicators and are detailed in the LogFrame Matrix (Annex F). This framework outlines baseline indicators at the onset of the project as well as target indicators for the project, both in terms of project implementation as well as outcomes.

- Specific: The indicators are in general specific. The only indicators which do not meet this criteria are those associated with Environmental Status which indicated areas of salinization, recharge, or sustainable water extraction with xxxx and yyyy. However, these values were somewhat refined through the TDA.
- Measureable: The indicators are all measurable or quantifiable.
- Achievable and Attributable: The indicators are all achievable, though the indicator for an “IAS tripartite agreement concluded” was very ambitious. All may attribute directly to activities undertaken by the project.
- Relevant and Realistic: The indicators are all relevant and realistic in terms of reflecting the interests expressed by the national stakeholders.
- Time-bound, Timely, Trackable and Targeted: All indicators are time-bound and targeted.

Baseline Assessment: The Project Document contains an assessment of the baseline situation and environmental benefits of incremental action (Table 2, page 18 (GEF, 2003b)). Environmental base line indicators are to be identified through the development of a TDA, recharge field studies (which were not conducted), hydro-geological surveys, isotope surveys; legal and social indicators through analysis of legal and institutional structures, and assessments of participation and awareness building methods.

Reporting: Section 5 of the Project Document (GEF, 2003b) contains details for monitoring and reporting as well as a table outlining reporting requirements (Annex F).

⁷⁸ GEF (2003b). *Project Document: Managing Hydrogeological Risk in the Iullemeden Aquifer System*. GEF, 12 December, 2003

4.5.2. M&E plan implementation.

Project reporting appears sporadic for the first 18 month period (January 2004 – June 2005). During this time the Project Coordinator was in Niamey and was moved to OSS offices in Tunis, where a full project team and support staff were available. Subsequently, progress implementation reviews and progress reports were submitted on a more regular basis, including those reviewed:

- *PIR (1 July, 2005-30 June, 2006)*. Sahara and Sahel Observatory, Tunis, June, 2006 (OSS, 2006e)
- *PIR (1 July, 2006-30 June, 2007)*. Sahara and Sahel Observatory, Tunis, June, 2007 (OSS, 2007d)
- *PIR (1 July, 2007-30 June, 2008)*. Sahara and Sahel Observatory, Tunis, June, 2008 OSS, 2008f)
- *Progress Report: 1 July - 31 December, 2007*, (OSS, 2007f)
- *Progress Report: 1 January - 30 June, 2007*. June, 2007 (OSS, 2007e)
- *Progress Report: 1 January-30 June, 2008*. June, 2008 (OSS, 2008h)

These reports appear to be complete and comprehensive in nature.

The major alteration in direction of the project occurred in June, 2005 with the development of the “New Orientation” document which significantly altered focus and budget lines accordingly. Subsequently, the reporting and reviews helped to keep the project on track, with the 2nd Steering Committee (SC) meeting making the bulk of recommendations to adapt to changes. There were three SC meetings during the project:

1st Inception and Steering Committee Meeting, Paris, February, 2004

2nd Steering Committee Meeting, Abuja, 25-26 February, 2006

3rd Steering Committee Meeting, Bamako, 4-12, May, 2008

The mid-term meeting in Abuja made numerous recommendations for advancement including:

- Deepen the TDA process in the IAS countries by quantitative assessment of pertinent risks
- The IAS countries unanimously agreed on the creation of coordination mechanism. The Steering Committee meeting calls on FAO and OSS to pursue the process of establishment of the above mechanism
- With a view to a more effective execution of the project, the Steering Committee members recommend to realign certain activities, notably those concerning the

identification of risks, with a view to adapting them to the attainment of the main objective. In this perspective, a work programme will be developed in two to three weeks time.

- The Steering Committee members recommend continuation of the process leading to a Strategic Action Plan (SAP), in cooperation with the different interested partners

Senior level ministry officials from Nigeria, Niger, and Mali; as well as representatives from UNESCO, UNEP, FAO, ABN, AGRHYMET and an observer from Algeria attended the 2nd Steering Committee meeting. Lists of participants for the final Steering Committee meeting in Bamako have not been viewed at the time of writing.

Project reporting appears to have assisted in providing management with information needed to make changes to the project activities and time frame. This is particularly true with the extension of the project and development of numerous outputs during that time.

M&E Implementation: Satisfactory

4.5.3. M&E Budget and Financing

The Monitoring and Evaluation plan was fully budgeted with \$30,000 US for External Monitoring and Evaluation (Terminal Evaluation) (Annex F), as well as sufficient project personnel, project management and coordination and administrative support (Annex 10 of GEF Project Document (GEF, 2003b)).

M&E Budgeting: Highly Satisfactory

4.6 F. Preparation and Readiness

The project's objectives and components were clearly laid out, practical and generally feasible within the timeframe of the project. The only objective that was perhaps overly ambitious was the '*establishment of a legal and institutional IAS cooperative framework*'. As one of the indicators associated with this objective, under Component 2, is '*an IAS tripartite agreement concluded*'⁷⁹, this suggests that a formal legal consultation agreement was envisioned within the time frame of the project. To put things in perspective, the Columbia Treaty between Canada and the US took 20 years to develop, including engineering studies. A similar time was needed between India and Nepal to develop the Mahakali River Treaty. The fact, therefore, that within a 4 year period a functioning temporary mechanism is in place, a draft protocol developed, and the countries have all committed to promote a formal consultative mechanism is not to be underestimated.

The components, and subsequent activities, were developed to build upon each other to achieve the project objectives and outputs in a timely fashion as per the LogFrame in the Project Document and in terms of the 'New Orientation' (See Figure 2, Section 2.2).

The executing institution, OSS, had extensive experience and knowledge, both technical and in terms of facilitation, having been played a similar role in the development of the North West Sahara Aquifer System between Tunisia, Algeria and Libya. This was clearly used to advance the project, particularly within the reframing of the project in June 2005 under the 'New Orientation'.⁸⁰

The capacities of OSS and its counterparts, IAEA, UNECE, ESA, ETH, IRD, UNESCO, and FAO appear to have been adequately considered when the project was designed. However, the need for large alterations in project implementation and budgeting in June 2005 suggests that roles and responsibilities, or expectations, were not clearly understood or appreciated by all parties at the onset.

- IRD did not conduct the field surveys for recharge as initially planned.
- ETH did not conduct the training or was involved in the development of the hydrogeological/mathematical model as initially planned.
- IAEA did not complete the common database as initially planned, though it did conduct isotope studies (however this was done in parallel of the IAS project and independently of any OSS coordination).⁸¹

The extension of the project affected the continued participation of several technical partners.

- UNESCO provided scientific and technical support, such as developing and initiating the project, providing TOR's for the consultant developing the Common Public Awareness Programme and the Policy Formulation in 2006, amongst other things. However its formal involvement appears to have stopped at the end of 2006.
- FAO was active in assisting the development of the Consultation Mechanism until the end of 2006 when its formal involvement stopped.⁸²

⁷⁹ See LogFrame Annex 25 of Project Document GEF (2003b). Ibid.

⁸⁰ OSS (2005d). *New Orientation*. Sahara and Sahel Observatory, Tunis, June, 2005

⁸¹ Aggarwal, P. (2008) Programme manager, Water Resources, Division of Isotope Hydrology Section, IAEA. Personal communication Email correspondence, 18 November, 2008, Dodo, A. K. (2008) Regional Coordinator, IAS Project, OSS. Personal communication 10-12 November, 2008

⁸² Burchi (2008), Personal communication – email, December 6, 2008.

4.7 G. Country ownership

The importance and relevance of the project to national development and environmental goals is evident from the continued ministerial level support which the project enjoys (See Annex D), and expressed throughout the interview process.

The countries have expressed their continued interest in supporting the IAS project.

- Niger is interested to continue the project and has made available some financial support from the Ministry for increased data and information monitoring. They have installed some 19 data loggers in the field are ready to have local staff in the districts take charge of them.⁸³ It is unlikely, however, that extensive fieldwork or new pilot areas will be developed without additional support.
- Niger spearheaded the development of the draft Protocol in 2008 independent of any assistance from FAO,⁸⁴ and the countries approved of the draft in June 2008.
- Officials in Mali have committed financial resources for the continuation of the project, to the extent that it is willing to organise and host the ministers meeting to advance a consultative mechanism for the IAS.⁸⁵
- Mali provided budget alterations for the eastern regions to support data gathering for the IAS, and in 2008 created the CDMT (Cadre de Dépense à Moins Termes) with the World Bank for investment in water related projects.⁸⁶
- Replication of the process in the region. Mali is looking to replicate the process used to develop cooperation under the IAS program to other aquifers it shares such as in the region of Le Fosse de Naras, which are shared aquifers with Mauritania; and the Plan de Gondo aquifers, which are shared with Burkina Faso.⁸⁷
- At a national level, academics in Mali are developing university courses in groundwater modelling to build future capacity and capability, and looking to use the tools for national issues.⁸⁸
- Mali has presented the project at a national water conference where there is increasing interest in pursuing groundwater issues.⁸⁹

⁸³ Issaka, I. (2008) General Secretary, Ministère de l'Hydrologique, Niger. Personal communication 14 November

⁸⁴ Kiari, K. N. (2008) Director de la Législation, Ministère de l'Hydraulique, Niamey, Niger. Personal communication 17 November, 2008

⁸⁵ Keïta, M. (2008) Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau. Personal communication 21 November, 2008

⁸⁶ Traoré, K. (2008) Project Director, Rual Water, Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique, Mali. Personal communication 22 November, 2008

⁸⁷ Ibid. Personal communication

⁸⁸ Traore, A. Z. (2008) Director of UFAC, Professor at Ecole National des Ingénieurs, Mali. Personal communication 21 November, 2008

⁸⁹ Maïga, S. (2008) National Focal Point Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique. Personal communication 20-22 November, 2008

- Nigeria has indicated its enthusiasm for the project, but has also suggested that budget limitations will likely affect its ability to engage as much as it would like to. A national project for the hydrological mapping of Nigeria will hopefully allow for more data to be forthcoming from that country.⁹⁰

Country Ownership: Satisfactory

4.8 H. Stakeholder participation / Public awareness

Stakeholder engagement. The Project Document adequately identified the variety of stakeholders that could be both positively or negatively affected by this project. The project identified senior water resource and environmental officers as the principle stakeholders, but also identified local communities and the direct water and land users and beneficiaries, and the sub-regional and bi-lateral bodies.

The project even identified the risk to local stakeholders, communities and NGO's not being properly involved and placed this as a medium risk which could be mitigated by information dissemination and redesign of institutional arrangements (Table 4 – Risks and mitigation measures in GEF Project Document (GEF (2203b)).

The project was extremely successful in engaging the national ministries of Mali, Niger and Nigeria in undertaking project activities in relation to project outputs. This was particularly true after June 2005 when the “New Orientation” focussed on supporting country involvement in data collection and report development, including:

- Conducting national level steering and scientific committees meetings.
- Research for the TDA, policy instruments, and legal mechanism.
- Collection of bore-hole and water point data and information. Over 17200 water points were collected.
- The development of TDA from national perspectives, as well as from a regional perspective (OSS, 2007a).
- Development of Policy Elements for Transboundary Risk Reduction of the IAS (OSS, 2008g).
- Development of a draft protocol for a consultation and management mechanism for the IAS. (Annex 4 of OSS, 2008i).
- Participatory Management of Risks document (OSS, 2008e).
- Inter-governmental communications tools document (OSS, 2008d).

⁹⁰ Chabo, J. (2008) Director of Nigeria Hydrological Service Agency, Ministry of Agriculture and Water. Personal communication 18 November, 2008

Collaboration with partners and institutions. The project did engage and collaborate with regional and sub-regional bodies such as ABN, ECOWAS and AGRHYMET, and they were invited to participate in Steering Committee Meetings.

Project documents such as correspondence and list of participants in meetings indicated that OSS made reasonable attempts to include partners such as IAEA, UNESCO, FAO, as well as regional bodies such as NBA, AGRHYMET participated in meetings.

It should be noted that in interviews with NBA personnel they expressed the opinion that more effort could have been made on the part of OSS to keep them informed of activities in between Steering Committee meetings.⁹¹

It should further be noted that it appears the cooperation between the various international partners was strained at times. OSS personnel noted that IAEA did not choose to correspond directly with OSS, but rather preferred to deal directly with National ministries, who then informed OSS of activities or meetings. Correspondence between the evaluator and IAEA confirmed that IAEA “did not participate closely in this project although they had a parallel project on isotope applications”.⁹² Moreover, the common database was anticipated to be developed by AGRHYMET-IAEA, but was finally, after several requests (See Section 2.2.2) was developed by OSS. This insinuates a less than satisfactory relationship and communication.

UNESCO was instrumental in assisting this project to come a reality and launching the project (See Section 2.2.2). As scientific and technical advisors, UNESCO participated in the first two Steering Committee meetings (Paris, 2004 and Abuja, 2006); however their participation appears to have waned after 2006. This is unfortunate as the major scientific developments and training regarding the common database and hydrogeological model were created in 2007 and 2008.

NGOs and Local Communities. The project did not engage NGOs or local community stakeholders, other than their identification in the Participatory Management of Transboundary Risks document.

Public awareness activities.

- Development of a website on <http://iullemeden.iwlearn.org>
- Presentations at 4th World Water Forum in Mexico
- Presentations in national water conference in Mali, Bamako, 2007.
- Development of a policy to create a strategy for building public awareness (Participatory Management of Risks document (OSS, 2008e)

Stakeholder participation: Moderately Satisfactory

⁹¹ Enoumba, H. C. (2008) Chef Division Etude de Planification, Autorité du Bassin du Niger. Personal communication 14 November, 2008.

⁹² Aggarwal, P. (2008) Programme manager, Water Resources, Division of Isotope Hydrology Section, IAEA. Personal communication Email correspondence, 18 November and 10 December, 2008

4.9 I. Financial Planning and Reporting

Major findings of Financial audit by KPMG Tunisie, March 31, 2008⁹³

- The project received in total \$US 958,000 (equivalent to € 687,000 when exchanged at different points throughout the project)
- \$US 80,000 was reserved for UNESCO, with the remaining \$US 878,000 for project activities under OSS.
- By March 31, 2008, \$US 710,000 (equivalent to €537,000) had been accounted for leaving € 53,000 remaining.
- FAO contributed \$30,000
- Canadian Cooperation through CIDA/ACDI contributed €165,000 for funding personnel and staff for the extension period of the project.
- GTZ contributed some €12,000 for digitized mapping.

It was decided at the 3rd Steering Committee Meeting in May 2008, to use the remaining €53,000, with an additional \$100,000 from UNEP, to conduct training courses for software use; and the Regional Workshop to develop a Consultative Mechanism in June, 2008.⁹⁴

Assessment of project expenses based on final reporting (Annex F)

The spreadsheet in Annex F is the Final Project Financial Reporting, and was provided by Sandeep Bhambra in an email relayed on January 14, 2009. Variation between the actual expenditure and the proposed expenditure is based on the revised project budget supplied by Rafik Ziadi, Chief Financial Administrator for OSS, on December 4th, 2008 in a separate email.

- There was a large cost savings between the proposed international consultants (\$52,480) and the actual international consultants (\$16,971). This was due to using international consultants from the region (Niger, Mali and Nigeria) to conduct work such as the assessment of the Participatory Management document.
- Sub-contracts were estimated to be \$37,213 and actual expenditure was \$35,243.
- The revised training component was allocated of \$335,895. The actual expenditure was \$399,399. There was more capacity building needed than was initially provided for. Several multiple week seminars were conducted for the database and modelling training.
- About \$10,000 more was spent on computer hardware and software than was anticipated.

⁹³ Presented at 3rd Steering Committee Meeting, Bamako, 9-10 May, 2008 (OSS (2008c). *Mission Report: Regional Steering and Scientific Committee Meetings, Bamako, 4-12, May, 2008*. Sahara and Sahel Observatory, Tunis, 14 May, 2008.

⁹⁴ See page 17 Ibid.

- A large amount of \$55,000 was estimated for communication and promotion of materials, this was distributed throughout the activities and components as opposed to having a line item for it.
- The UNEP and UNESCO had a subcontract for \$80,000.
- \$30,000 was budgeted for the terminal evaluation, and \$30,676 was spent.
- There appears to have been problems associated with exchange rates and the value of the Euro versus the US Dollar during the course of the project which led to some losses in spending power and accounting difficulties.⁹⁵

Influence of financial reporting on project management

The large alteration in project implementation and budgeting following the ‘New Orientation’,⁹⁶ in June 2005, as well as the mobilisation of activities and meetings in 2008, suggest that financial reporting had a positive influence on project management.

Due diligence in financial reporting

Interviews with Ms. Simen, Management and Financial Coordinator, Mr Ben Saoud, Internal Auditor for the project, and Rafik Ziadi, OSS Accountant, revealed no obvious problems with internal financial controls once the project was entirely administered from the OSS offices in Tunis in 2005.⁹⁷ The basic financial management controls and due diligence in reporting internal to OSS were confirmed during an interview with Ms Mariem Ennaifer, a senior auditor with KPMG Tunisie.⁹⁸

Sources of co- financing and leveraged financing

The main sources of co-financing anticipated for the project were:⁹⁹

Entity	US\$
Cost to the GEF Trust Fund	958,000
Co-funding	
<u>In-cash:</u>	
FAO	300,000
IAEA	350,000
Sub-total	650,000
<u>In-kind:</u>	
IGRAC	30,000
IRD-HSM	20,000
UNESCO/IHP	60,000
UNESCO/ISARM	20,000
Sub-total	130,000
Total Cost	1,738,000

⁹⁵ Ben Saoud, M. N. (2008) Internal Auditor, OSS. Personal communication 10-11 November, 2008

⁹⁶ OSS (2005d). *New Orientation*. Sahara and Sahel Observatory, Tunis, June, 2005

⁹⁷ Ben Saoud, M. N. (2008) Internal Auditor, OSS. Personal communication 10-11 November, 2008, Silmen, Z. B. (2008) Management and Financial Coordinator/ Administrator, OSS. Personal communication 10-11 November, 2008, Ziadi, R. (2008) Accountant, OSS. Personal communication November 12; December 5, 2008

⁹⁸ Ennaifer, M. (2008) Senior Auditor, KPMG Tunisie. Personal communication 11 November, 2008

⁹⁹ GEF (2003b). *Project Document: Managing Hydrogeological Risk in the Iullemeden Aquifer System*. GEF, 12 December, 2003

Final accounting for co-financing is given in Table 3.

Additional co-financing came in the form of:¹⁰⁰

1. A grant from the Canadian Cooperation fund of CIDA. The fund was not specific to the GEF project, but rather to support OSS in general. The final amount was confirmed to be €104,466 (\$140,905).
2. GTZ contributed €19,782 (\$26,682).
3. ESA contributed €35,000 (\$47,208).
4. In kind contributions from the governments of Mali, Niger and Nigeria, estimated at US\$169,500. (this is derived from discussions with OSS and National Focal Points, and is based on in kind contributions of personnel and equipment etc.)

¹⁰⁰ Figures adjusted based on email of January 14, 2009 from Rafik Ziadi

Table 3 Co-financing Report Supplied by OSS (Cumulative to June 2008)

Co financing (Type/ Source)	IA own Financing (mill US\$)		Multi-lateral Agencies (Non-GEF) (mill US\$)		Bi-laterals Donors (mill US\$)		Central Government (mill US\$)		Local Government (mill US\$)		Private Sector (mill US\$)		NGOs (mill US\$)		Other Sources* (mill US\$)		Total Financing (mill US\$)		Total Disbursement (mill US\$)			
	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual		
Grant	958.000	958.000	650.000																			
Credits																						
Loans																						
Equity																						
In-kind			130.000																			
Non-grant Instruments																						
Other Types																					1.738.000	
TOTAL		958.000	780.000																			1.738.000

Please describe "Non-grant Instruments" (such as guarantees, contingent grants, etc):

Please explain "Other Types of Co-financing":

The Government **in-kind** contributions are US\$ **169.500**

Please explain "Other Sources of Co-financing":

ACDI (Canada) : \$140,905

GTZ :serveur cartographique (cf CTN°61/Abdous B11/3/2&B11/7/3/2005) \$26,000

ESA (5 000 € par pays (3)+20 000 € pour AGRHYMET) \$ 47,208

Verification of co-financing

Indeed, verification was challenging as the funds were not channelled through either the implementing or executing agencies. Verification of the co-financing was conducted by interviews and assessing the actions undertaken by the various organizations and governments involved in carrying out the project. No receipts or financial verification of co-financing was seen.

1. FAO

The FAO undertook the project “Establishment of a mechanism for tri-partite consultation in the management of the Iullemeden Aquifer System” for developing a mechanism for permanent tri-partite consultation for coordinated and sustainable management of the aquifer. FAO representatives and consultants both hosted and attended meetings, as well as provided oversight and research through the development of briefing documents.

2. IAEA

The International Atomic Energy Agency was to initiate RAF/8/038 “Development of Water Resources in the Iullemeden Aquifer System”, which provided for establishment of a common Iullemeden database, and (b) pilot studies using isotope technology in selected border and other sections. The base was to be developed in conjunction with AGHRYMET, though was not forthcoming (See Section 2.2). Interviews confirmed that isotope surveys were conducted and reports sent to the relevant ministries, which forwarded the information to OSS.

3. IGRAC

International Groundwater Resource Assessment Centre collaborated with building information of the Iullemeden Aquifer System into its Meta Information Module (MIM) which is the reference corps for the Global Groundwater Information System (GGIS). This was done in collaboration with ISARM and is mentioned in their 2007 newsletter.¹⁰¹ This was for global dissemination of project data and to develop data standards for inter-compatibility with other aquifer systems.

The OSS activity report for 2004-2005¹⁰² participation of the IGRAC at the inception meeting in Paris 21-22 February, 2004. However, there is little to no mention of their further involvement in project documentation. Also, a search of the MIM system (<http://www.igrac.nl/publications/124#>) revealed that while the Iullemeden project is mentioned and can be found under Niger, Mali and Nigeria, there is no additional information associated with it in the MIM system. Where as a search under South African Development Community project brought up 17 organisations, 13 experts, and 12 documents.

There is a Global Overview Map, however regardless of the browsing program and operating system used, it could not be opened to check its contents.

4. IRD

Institut de Recherche pour le Développement was to conduct base-line field surveys to study recharge in identified areas (GEF Project Document, 2003). The field surveys were not carried out, though some analysis of existing data was done.¹⁰³

¹⁰¹ IGRAC (2007). Newsletter #3. retrieved November 28, 2008 from www.igrac.nl/publications/231

¹⁰² OSS (2006a). *Activity Report (Rapport d'Activites) 2004-2005*. Sahara and Sahel Observatory, January, 2006

¹⁰³ Dodo, A. K. (2008) Regional Coordinator, IAS Project, OSS. Personal communication 10-12 November, 2008

5. IHP-UNESCO

The International Hydrological Programme of UNESCO provided scientific supervision for the project. UNESCO representatives attended workshops and meetings related to scientific and legal issues, including the 1st and 2nd Steering Committee Meetings.

6. ISRAM

The International Shared Aquifer Resource Management programme, UNESCO, also was to collaborate in the dissemination of data for Iullemeden on a global level, including translation of project-produced documents, from/to other ISARM projects with project information reported, recognized and followed up under global and regional strategies, meetings initiatives under the ISARM programme (GEF Project Document, 2003). A search of their website (www.isram.net) revealed presentations and papers delivered by Bo Applegren (UNESCO-FAO consultant). However, the reference database is related to the ICRAC and their MIM, and has no information regarding the Iullemeden Aquifer System. There is a Global Overview Map, however regardless of the browsing program and operating system used, it could not be opened to check its contents.

7. National Governments

The national governments of Mali, Niger and Nigeria appeared to have contributed significantly to the success of the project in terms of time, space and activities. A significant portion of the water point data which made up the Common Database was obtained through collection and collation of data by ministry staff in the various countries. This made up the bulk of the information for the system.

In terms of time spent on project related activities over the last 2-3 years, estimates range from 3-5 days/month of time for 2-3 people from each country. Also, it should be noted that personal expenses in terms of communication costs were also significant. Most communication was conducted using cell phones, and National Focal Points, as well as other ministry staff would spend up to CFA 15-20,000/ month (30-40\$US/month) on project related communication calls. This seems a reasonable estimate based on personal experience using cell phones in the region.

In developing and overall rating, a balance was struck between fulfilling reporting requirements and an assessment of how the project followed its projected financial trajectory. It should be noted that significant alterations were made to the budget and programs in 2005, and it is based on this new orientation that money administered by OSS has been assessed; while co-financing was assessed from the initial Project Document approved by GEF in 2003.

Financial Planning and Reporting: Satisfactory

4.10 J. Implementation approach:

Project Implementation Mechanisms

The wealth of reporting (See Table 2) and confirmation during interviews indicate that the project implementation mechanisms, in terms of Steering Committee, National Committees, and regional and national Scientific Committees were well established and served to inform the project. Committee reports outline the discussions held and the decisions made and carried forward during the life of the project.

Adaptability

The project managers, both in OSS and UNEP, displayed a good degree of flexibility and adaptability in the face of changes and alterations. This was evident both from the creation of the ‘new orientation’¹⁰⁴ in 2005 with significant alterations in program activities and corresponding budget allocation, including training and placing greater emphasis on country participation; and the project extension of 18 months allowing the activities to come to fruition.

The 2nd Steering Committee meeting, February 2006, approved of alterations and made further recommendations as to how to meet the project goals. Policy level management appeared to be adaptive and creative.

The day-to-day management in the countries also appears to have been able to adapt to changing circumstances related to project partners and project activities. This is particularly true in the case of data collection and collation which became increasingly the responsibility of the national ministries.

A review of Section 2.2 assists the assigning of an overall rating.

Implementation Approach: Highly Satisfactory

¹⁰⁴ OSS (2005d). *New Orientation*. Sahara and Sahel Observatory, Tunis, June, 2005

4.11 K. UNEP Supervision and Backstopping

The supervision and support by UNEP staff appears to have been effective and well received by the executing agency, OSS, as well as by the regional stakeholders.¹⁰⁵ OSS staff attended meetings in Nairobi with the Fund Manager to assist in financial accounting and planning.

The UNEP showed adaptability, flexibility and understanding with respect to alterations of project timelines, objectives and budget allocations. The project underwent a realignment process in 2005 resulting in slightly different operations than were initially conceived and approved of. This required appropriate budgetary alterations and an initial project extension to September 2007, which was then further extended to June 2008.¹⁰⁶

The only evident administrative issue adversely affecting the project was the initial placement of the Project Coordinator in Niamey, Niger, while the executing agency, OSS, was in Tunis, Tunisia. This was decided at the 1st Steering Committee Meeting in February, 2004.

The rationale for having the Project Coordinator in Niamey was originally sound. It is in the project region, there is access to regional institutions such as ABN AGRHYMET, and the Dr. Dodo, being a national of Niger and having worked there, needed no integration into working conditions.

The lack of a core project team and administrative support from OSS offices, however, seems to have had a negative impact on the project. Once the Project Coordinator moved to the OSS offices in Tunis in 2005, and the new project orientation developed, the project proceeded as generally planned.¹⁰⁷

The only issue of administration that was brought up by the stakeholders was the fact that language was a barrier on occasions. Most of the project management and stakeholders were Francophone and thus the original documents and most meetings were held in French. However, it appears that every attempt was made to translate documents quickly and to help facilitate communication at meetings, either with simultaneous translation at larger meetings, or with participants and staff assisting at smaller meetings.¹⁰⁸

UNEP Supervision and Backstopping: Satisfactory

¹⁰⁵ As per interviews – all National Focal Points and senior Ministry staff.

¹⁰⁶ Ben Saoud, M. N. (2008) Internal Auditor, OSS. Personal communication 10-11 November, 2008, Dodo, A. K. (2005). *Message regarding: Aquifer Recharge Study*. Sahara and Sahel Observatory, 21, October, 2005

¹⁰⁷ OSS (2005d). *New Orientation*. Sahara and Sahel Observatory, Tunis, June, 2005

¹⁰⁸ As per interviews.

4.12 Conclusions and rating

Table 4 : OVERALL RATINGS TABLE

Criterion	Evaluator's Summary Comments	Evaluator's Rating
A. Attainment of project objectives and results (overall rating) Sub criteria (below)	Overall the project attained most of the objectives in a fiscally responsible manner	S
A. 1. Effectiveness	Effective in establishing the majority of objectives and outputs.	S
A. 2. Relevance	Very relevant to GEF priorities, particularly SP-3 and SP-2	HS
A. 3. Efficiency	The project delays and alterations in partnerships may have affected the efficiency of obtaining objectives	MS
B. Sustainability of Project outcomes (overall rating) Sub criteria (below)	The overall sustainability of the project objectives appears good, though additional funding and facilitation will be needed to ensure continuity in the short term.	ML
B. 1. Financial	The countries have indicated their interest to continue to develop the project, and in some cases committed some resources to it.	ML
B. 2. Socio Political	There are no apparent socio-political risks to hinder the project outcomes	L
B. 3. Institutional framework and governance	A functioning temporary structure is in place, however, an institutional mechanism will be needed to sustain project objectives	ML
B. 4. Environmental	The major environmental risks were identified and are being addressed by the project itself.	ML
C. Achievement of outputs and activities	The intended outputs were generally well achieved	S
D. Catalytic Role	The project has a catalytic role both regionally and nationally.	S
E. Monitoring and Evaluation (overall rating)	The overall M&E was well done.	S

Criterion	Evaluator's Summary Comments	Evaluator's Rating
Sub criteria (below)		
E. 1. M&E Design	The design and funding for the M&E was consistent with GEF criteria	S
E. 2. M&E Plan Implementation (use for adaptive management)	The reporting allowed for adaptive management of the project	S
E. 3. Budgeting and Funding for M&E activities	There was sufficient money for M&E activities.	HS
F. Preparation and readiness	The alterations in project partnerships, activities, and budget lines in 2005 suggests that the project could have had better upfront design	MS
G. Country ownership / drivenness	The countries have indicated and demonstrated a willingness to continue the implementation	S
H. Stakeholders involvement	The project focuses on ministry level staff and was successful in their engagement. No local or NGO was involved, though it was anticipated to do so at the onset.	MS
I. Financial planning	The project remained within the budget, though there were differences between planned and actual budgets.	S
J. Implementation approach	The project management, OSS and UNEP, were very adaptive at dealing with new situations.	HS
K. UNEP Supervision and backstopping	The support given to the project from the UNEP was clearly adequate.	S

5. Lessons learned

1. Project Team Design

Context: The Project Coordinator was initially in a different country than the rest of the executing agency team. This did not allow for sufficient connection and communication between the project team which was essential. Once he was moved to OSS offices and able to work in close coordination with other technical specialists and administrative staff the project activities advanced well.

Prescriptive Action: Ensure a sufficiently robust and functioning project team, which has a highly developed line of communication, particularly if members are not in the same institution. For instance instigate regular conference calls, as opposed to an as needed basis.

Other contexts: All projects.

2. Use of Scientific Work to Drive Political Framework

Context: The project focussed on developing a solid technical understanding of the aquifers through the development of a common database and numerical model. This then drove the institutional, political and social agendas. It was instrumental in developing awareness and support at the political level. So while it did not achieve all its objectives in legal and social realms, it provided a very solid foundation to do so in the future.

Prescriptive action: Emphasise a solid and easily communicated understanding of the technical aspects of the resources in question to facilitate legal or policy development.

Other contexts: All projects where political and social awareness needs to be built.

3. Emphasize a functional legal mechanisms

Context: One of the objectives of the project was to develop a formal legal mechanism for consultation which was agreed and signed by the countries. This proved to be beyond the ability of the project, though great advancement was made in that direction. Nevertheless, a functional mechanism exists and is being used while talks may continue regarding a formal mechanism.

Prescriptive action: Emphasise the development of functional mechanisms which should be established, such as MOUs between institutions or agencies. These can evolve and later formalised into agreements at the State level.

Other contexts: Any project where legal development is concerned.

6. Recommendations

As the project has been terminated these recommendations are regarding future work in the short and medium terms.

1. Develop the legal and institutional mechanisms (arrangements) necessary to continue to develop cooperative management of the water resources in the basin.

Issue: The legal and institutional mechanism for consultation has not been reached. A draft protocol for consultation and the sustainable management of the IAS has been developed, however, issues remain regarding some substantive elements as well as determining a regional institution in which to house the agreement.

Recommendation: Place emphasis on maintaining the political momentum which has developed during this project. Keep the agreement focussed on the three countries currently engaged, Mali, Niger and Nigeria, at least for the time being. This activity could be a smaller stand alone project, or part of a larger regional initiative. However, the important point is not to let it be driven, or slowed, by another process.

The first step will be to agree upon a suitable regional institution. It is suggested to use a structured approach to determining the most viable mechanism (<http://www.structureddecisionmaking.org>). Clear criteria should be determined for the selection and agreed upon by all stakeholders, such as

- Appropriate mandate, experience and influence
- Capacity and capability
- Ability to raise funds and sustain a secretariat and activities.
- Financial accountability
- Transparency

Alternatives such as ABN or ECOWAS, or develop a new institution should be evaluated systematically as pre the evaluation criteria, this assists transparency in decision making.

This activity should be facilitated by an independent non-regional entity or by one of the organizations which has already proven themselves in the project, such as UNEP or FAO.

2. Continue to refine the database and model

Issue: The model and database currently do not provide sufficient rigour to be used with confidence as a policy development tool. This was made clear in both interviews and documentation. It is however a powerful communication tool and can be refined to provide greater confidence for policy development.

Recommendation: Place emphasis over the next 3-4 years on supporting the national ministries to conduct appropriate fieldwork to refine the database. Studies should also address and clarify interaction between surface water (such as the Niger River) and groundwater.

UNEP, UNDP or UNESCO should consider actively helping the ministries to find specific funding for field activities. The risk is that the database and model remain an

excellent first cut, but are not sufficiently refined to help drive political action on addressing transboundary risks.

3. Maintain inertia and develop an SAP for the basin

Issue: The project did not develop a Strategic Action Plan to help leverage funding and investment to address the identified risks.

Recommendation: Mobilize funding to develop an SAP for the basin to allow for financial backing for policy recommendations to be implemented. The appropriate agency would be a GEF related institution.

4. At the appropriate time expand the project to include other Algeria and Benin.

Issue: Algeria and Benin are part of the Iullemeden basin, though not on the same scale as Mali, Niger and Nigeria. Algeria has been participating as an observer to some of the Steering Committee meetings.

Recommendation: When there is sufficient momentum from the three primary countries, Mali, Niger and Nigeria, formally invite the participation on Algeria and Benin. To invite them to participate too early might stall or delay the advancement of the three initial countries.

7. Annex A List of Interviewees

Person	Position	Contact	Day
Tunisia (November 9-12)			
Dr. Abdel Kader Dodo	Regional Coordinator Sahara and Sahel Observatory OSS	Tél : (216) 71206633 Cel : 216-20 63 12 94 abdelkader.dodo@oss.org.tn	10-12
Dr. Ahmed Mamou	Scientific Advisor, Water Program, Sahara and Sahel Observatory OSS	Tel: (216) 71 206 6633 ahmed.mamou@oss.org.tn	10-12
Dr. Mohamedou Ould Baba Sy	Database and modelling Hydrologist, GIS specialist, Sahara and Sahel Observatory OSS	Tel: (216) 71 206 6633 Em: lamine.babasy@oss.org.tn	10-12
Mariem Ennaifer	Senior Auditor, KPMG Tunisie	tel: 216-71-19-43-44EM: mennaifer@kpmg.com.tn	12
Mohamed Néjib Ben Saoud,	Internal Auditor, Sahara and Sahel Observatory	Tel: (216) 71 206 6633	11
	Administrative Coordinator	Tel: (216) 71 206 6633	11
Niger (November 13-17)			
Mr Sanoussi Rabé	National Focal Point Hydrologist, Ministère de l'Hydrologique.	Tel: (227) 20 72 38 89 Em: rsanoussi2001@yahoo.fr	13-14
Mr. Issoufuo Issaka	Secretary General of Water Resources, Ministère de l'Hydrologique	Cel: (227) 96 15 79 10 issakissouf@yahoo.fr	14
Dr. Abdou Guero	Notional Coord Committee Director of Water Resources, Ministère de l'Hydrologique	Tel: (227) 20 72 38 89 Cel: (227) 96 99 46 10 Em: abdou.guero@gmail.com	13
Dr. Pibgnina Bbazie	Hydrologist, Centre Régional AGRHYMET	Tel : (277) 20 733116 Em: P.Bazie@agrhymet.ne	14
Alio Agolimo	GIS Technician, Centre Régional AGRHYMET	Tel: (277) 20 733116 Em: A.Agolimo@agrhymet.ne	14
Dr. Henri Claude Enoumba	Chef Division Etude de Planification, Autorité du Bassin du Niger	Tel. 227—96 57 90 32 Em: hcenoumba@abn.ne	14
Didier Zinsou	Expert en ressources en Eau, Autorité du Bassin du Niger	227—20 31 52 39 Em: dzinsou@abn.ne	14
Pascal Kabore	Hydraulicien, Autorité du Bassin du Niger	Kapayroes@abn.ne	14
Abdoulaye Doumbia	Ingénieur Hydraulicien y Modélisation , Autorité du Bassin du Niger/	227—20 31 52 39	14
Pierrick Fraval	Environmental Advisor for Niger Basin Authority	Em: p.fraval@abn.na	14
Atahirou Karbo	Consultant spécialiste des ressources en eau/National water resources consultant -Niger	Tel. (227) 877523 Em: atahiroukarbo@yahoo.fr	14
Kaïgama Kiari Noudjia	Direction de la Législation, Ministère de l'Hydraulique, Niamey, Niger	+227-20723889 Cel : +227-96595571 Em: jurisconsultekiari@yahoo.fr	17
Mr. Garba Radji	National Scientific Committee Dept. Of Water Resources, Ministère de l'Hydrologique, Niger	Tel: (227) 96 96 77 52 garbaradji@yahoo.fr	14

Nigeria (November 17-19)			
Mr. John Chabo	National Focal Point Hydrological Services Agency, Ministry of Agriculture and Water Resources	Tel: (+234)-80-60019525 Fax (tel): (+234) 9 234 3714 Em: johnchabo@yahoo.com	18
Patrick Oburo	Hydrologist Hydrological Services Agency, Ministry of Agriculture and Water Resources	Cel: 08059692328 poburo@yahoo.com	18
Sunday Hussani	Hydrological Services Agency, Ministry of Agriculture and Water Resources	Tel: +234 09 2342520 hussainisunday@yahoo.co.uk	18
Chris Maduabuchi	Hydrological Services Agency, Ministry of Agriculture and Water Resources	cel: 08037022484 maduchristo@yahoo.com	18
Babarinde Mukaile	Database and modelling Hydrogeologist Hydrological Services Agency, Ministry of Agriculture and Water Resources	babarinadesm@yahoo.com	19
Mali (November 20-22)			
Séïdou Maïga	National Focal Point Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique	Cel: (+223) 672 68 79 sdmaiga@yahoo.fr	20- 21
Amadou Zanga Traore	Scientific Committee Director of UF AE, Professor at Ecole National des Ingénieurs, Mali	Cel: (+233) 20 22 75 65 Amadou.z.traore@ufae.org	21
Karaba Traoré	Scientific Committee Hydraulic engineer, Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique	Cel: (+233) 678 29 26 karabatratore@hotmail.com	21
Damassa Bouare	Database and modelling Administrateur base SIGMA Centre de Documentation et d'informatique de la DNH	Tel: (+233) 7616 2546 bouaredamassa@yahoo.fr	21
Housseini Amadou Maïga	National Steering Committee Président Partenariat National de l'Eau du Mali, National Focal Point for ABN	Cel: (+233) 672 28 48 housseiniamaiga@yahoo.fr pnemail@afribonemali.net	21
Mohammed Keïta	National Steering Committee Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique	Tel: (+233) 22 78 51 modoukeital@yahoo.fr	21
International			
Bo Appelgren	UNESCO/IHP -ISARM Programme	+Tel(39) 0761 797112 Em: appelgrenbo@gmail.com	8
Stefano Burchi	Senior Legal Officer Development Law Service FAO	Tel : 0039 06 57053959 Em : stefano.burchi@fao.org	5

8. Annex B: References, Documents Reviewed and Personal Communications.

Personal Communication

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Bouare, D. (2008) Database and modelling Expert for IAS Administrateur base SIGMA Centre de Documentation et d'informatique de la DNH, Mali. Personal communication 21 November, 2008

Burchi, S. (2008) Senior Legal Officer, Development Law Service, FAO. Personal communication 5 November, 2008

Chabo, J. (2008) Director of Nigeria Hydrological Service Agency, Ministry of Agriculture and Water. Personal communication 18 November, 2008

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Ennaifer, M. (2008) Senior Auditor, KPMG Tunisie. Personal communication 11 November, 2008

Enoumba, H. C. (2008) Chef Division Etude de Planification, Autorité du Bassin du Niger. Personal communication 14 November, 2008

Guero, A. (2008) Directeur de Ressources en Eau, Ministère de l'Hydrologique, Niger. Personal communication 13 November, 2008

Issaka, I. (2008) General Secretary, Ministère de l'Hydrologique, Niger. Personal communication 14 November

Keïta, M. (2008) Senior Technical Council to the Minister, Ministère des Mines, de l'Energie et de l'Eau. Personal communication 21 November, 2008

Kiari, K. N. (2008) Director de la Législation, Ministère de l'Hydraulique, Niamey, Niger. Personal communication 17 November, 2008

Maïga, S. (2008) National Focal Point Ministère des Mines, de l'Energie et de l'Eau; Directrice Nationale de l'Hydraulique. Personal communication 20-22 November, 2008

Mukaile, B. (2008) GIS and Modelling Expert for IAS, Hydrological Services Agency, Ministry of Agriculture and Water Resources, Nigeria. Personal communication 19 November, 2008

Nakamura, T. (2008) UNEP/GEF International Waters SPO. Personal communication 27 November, 2008

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9. Annex C : Interview Questionnaire

Terminal Evaluation of the UNEP GEF project “Managing Hydrogeological Risk in the Iullemeden Aquifer System”

Questionnaire 1

A Effectiveness, Relevance, Efficiency
<i>Has the project been effective in developing technical capacity and cooperation within the basin for joint management of risks?</i>
<i>If nothing more is done, will the project achieve positive long term impacts for the region (5-10 years)?</i>
<i>Where the project’s outcomes consistent with GEF priorities?</i>
<i>Was the project cost effective?</i>
<i>Was the project implementation delayed , and did that have an effect on cost effectiveness?</i>
<i>Did the project build on earlier initiatives, make use of scientific information and data?</i>
B Sustainability
<i>What is the likelihood that financial and economic resources will be available once GEF Assistance stops</i>
<i>To what extent will the outcomes of the project be dependent upon continued financial support?</i>
<i>Are there any social or political risks that may jeopardize sustenance of project outcomes?</i>

<i>What is the risk that the level of stakeholder ownership will be insufficient to allow the project outcomes to be sustained?</i>
<i>Do the various key stakeholders see that it is in their interest that the project benefits continue to flow?</i>
<i>Is there sufficient public / stakeholder awareness in support of the long-term objectives of the project?</i>
<i>To what extent is the sustenance of the outcomes of the project dependent on issues relating to institutional frameworks and governance?</i>
<i>What is the likelihood that institutional and technical achievements, legal frameworks, policies and governance structures and processes will allow for, the project outcomes/benefits to be sustained?</i>
<i>Are the required systems for accountability and transparency and the required technical expertise in place to continue.</i>
<i>Are there any environmental risks that can undermine the future flow of project environmental benefits?</i>
<i>Are there any activities in the project area that will pose a threat to the sustainability of the project outcomes?</i>
C. Achievement of outputs and activities:
<i>Where all expected outputs of the project delivered as programmed?</i>
<i>Where all expected outputs of the project delivered useful and on time?</i>

D. Catalytic Role
<i>What examples are there of other areas, in Africa or elsewhere, that are building on the lessons and experiences of this project?</i>
<i>Are there examples of the lessons and experiences learned in this project being advanced and expanded on by other funding sources?</i>
E. Assessment of Monitoring and Evaluation Systems
<i>What was the effectiveness of monitoring and evaluation tools?</i>
<i>Where risks adequately addressed</i>
<i>M&E design - was it well designed</i>
<i>Implementation</i>
<i>Budgeting and funding? Adequate and timely?</i>
F. Preparation and Readiness
<i>Were the project's objectives and components clear, practicable and feasible within its timeframe?</i>
<i>Were the capacities of executing institution and counterparts properly considered when the project was designed?</i>

<i>Were lessons from other relevant projects properly incorporated in the project design?</i>
<i>Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project implementation?</i>
<i>Were counterpart resources (funding, staff, and facilities), enabling legislation, and adequate project management arrangements in place?</i>
G. Country ownership
<i>Was the project effective in catalyzing action taken by the authorities in the countries that received assistance from the project?</i>
What actions ?
<i>What is the level of country commitment to facilitating financial and in-kind contributions to the project?</i>
H. Stakeholder participation / public awareness:
<i>Where the mechanisms put in place by the project for identification and engagement of stakeholders in each participating country successful?</i>
Strengths and weaknesses
<i>Were collaboration/interactions between the various project partners and institutions during the course of implementation of the project effective?</i>
<i>Were public awareness activities undertaken during the course of implementation of the project effective?</i>
I. Financial Planning

<i>Assess the strength and utility of financial controls, including reporting, and planning to allow the project management to make informed decisions regarding the budget and allow for a proper and timely flow of funds for the payment of satisfactory project deliverables</i>
<i>Actual project costs compared to budget</i>
<i>Present major findings from financial audit</i>
<i>Sources of cofinancing - verification</i>
<i>Appropriate standards of diligence.</i>
<i>Final and actual costs -</i>
J. Implementation approach:
analysis of the project's management framework, adaptation to changing conditions (adaptive management), partnerships in implementation arrangements, changes in project design, and overall project management. The evaluation will
<i>Have project documentation been followed, committees etc...</i>
<i>Including: effectiveness and efficiency and adaptability of project management – day to day as well.</i>
K. UNEP Supervision and Backstopping
<i>Assess the effectiveness of supervision and administrative and financial support provided by UNEP/DGEF.</i>
<i>Identify administrative, operational and/or technical problems and constraints that influenced the effective implementation of the project.</i>

10. Annex D : Examples of Letters of Support

MINISTRE DES MINES DE L'ENERGIE ET DE L'EAU

SECRETARIAT GENERAL

REPUBLIQUE DU MALI
Un Peuple - Un But - Une Foi



N° 005.14 /M.M.E.E - SG/DNH

Bamako, le 28 MAR 2007

*Le Ministre des Mines de l'Energie
et de l'Eau*

A Monsieur le Directeur Général
du Programme des Nations Unies pour
l'Environnement (PNUE)
Nairobi (Kenya)

S/C Monsieur le Ministre des Affaires Etrangères
et de la Coopération Internationale
Bamako

Objet:

Projet Gestion des Risques Hydrogéologique du Système Aquifère
d'Iullemeden : Demande de formulation d'un Programme d'Actions Stratégiques

Monsieur le Directeur Général,

J'ai l'honneur de vous informer que le Mali, le Niger et le Nigeria ont exprimé leur volonté pour la formulation d'un important Programme d'Actions Stratégiques (PAS) lors de la réunion tenue les 25 et 26 février 2006 à Abuja par le Comité de Pilotage dans le cadre du projet visé en objet.

Ce PAS fera suite à la réalisation de l'Analyse Diagnostique Transfrontalière (ADT) et la mise en place de l'instrument juridique de concertation tripartite dans le cadre de la gestion des ressources des aquifères d'Iullemeden entre les pays. Il vise à minimiser les risques hydrogéologiques transfrontaliers et s'étalera à court et moyen terme sur 2 à 5 ans.

Aussi, vous saurais-je gré des dispositions que vous voudriez bien prendre pour la formulation de ce PAS qui s'appliquera aux eaux souterraines.

Je vous prie d'agréer, Monsieur le Directeur Général, les assurances de ma haute considération.

Ampliation :

- Monsieur le Secrétaire Exécutif de l'OSS

P/Le Ministre /P.O
Le Secrétaire Général



André Traore
André TRAORE

20/36
2017



REPUBLIQUE DU NIGER
MINISTRE DE L'HYDRAULIQUE

Niamey, le 31 AOUT 2007

N° 00604
N/Réf : /MH/DRE

LE MINISTRE,

A

Monsieur le Directeur Général de
l'Organisation des Nations Unies
pour l'Alimentation et
l'Agriculture (FAO).

ROME (Italie)

Objet : Projet de Gestion des risques
hydrogéologiques dans le Système
Aquifère d'Iullemeden (Mali, Niger, Nigéria)

Monsieur le Directeur Général,

Dans le cadre du Projet cité en objet, votre institution a contribué au financement de la première phase ayant permis la conception d'un mécanisme tripartite de concertation et l'élaboration d'un avant-projet de charte qui sera soumis aux Etats participants (Mali, Niger et Nigéria) en vue de sa ratification ultérieure.

Je voudrais vous exprimer toute ma gratitude pour cette assistance dont les résultats faciliteront une gestion durable, concertée et pacifique des ressources en eau partagées du Système Aquifère d'Iullemeden.

La deuxième phase du projet consistera à l'harmonisation des points de vue des Etats sur le mécanisme ci-dessus précité, la signature d'une charte adoptée par consensus et enfin l'installation effective d'un secrétariat exécutif intérimaire pour une période allant de un à deux ans.

Aussi, voudrais-je vous demander de bien vouloir accepter de soutenir nos Etats jusqu'à la mise en place effective de ce mécanisme, qui du reste, sera le premier du genre au Sud du Sahara.

Veillez agréer, Monsieur le Directeur Général, l'assurance de ma considération distinguée.



AMINOU TASSIOU

Ampliation :

- Monsieur le Secrétaire Exécutif de l'OSS.



FEDERAL MINISTRY OF WATER RESOURCES
OFFICE OF THE HONOURABLE MINISTER OF STATE

Office: Federal Secretariat,
Area 1, P.M.B 159,
Garki Abuja Nigeria.

Tel: 09-2344736
Fax: (09)234-7349

Ref No.
MWR/HH/S/421/SUB/VoLII/324

Date
3rd March, 2007

Takehiro Nakamura
Project Management Officer
International Water
UNEP
P.O. Box 30552
Nairobi, Kenya.

**RE : FORMATION OF STRATEGIC ACTION PROGRAMME
OF IULLEMEDEN AQUIFER SYSTEM**

It gives me pleasure to inform you that Nigeria, as Mali and Niger Republics, requests the immediate formation, as a supplementary project activity under the Global Environment Facility project, of a Strategic Action Programme immediately after the realization of the Transboundary Diagnostic Analysis of Iullemeden Aquifer System.

2. It is necessary for me to remind you that, through the 5th recommendation at the 2nd Steering Committee of the project Meeting, held in Abuja on February 25th - 26th 2006, Mali, Niger and Nigeria had already expressed their interest to carry on with the Global Environment Facility process leading to a Strategic Action Programme, in cooperation with the other interested partners.
3. In addition, the three countries had again expressed their commitment to pursue this process during the closing seminar of FAO project TCP/RAF/3001 on "Establishment of a tripartite consultation

■ CONTINUATION ■

mechanism for the management of the Iullemeden Aquifer System" held in Rome on 19th – 20th October, 2006 in the premises of FAO Headquarters.

4. The immediate formation of the Strategic Action Programme and its implementation through the Project Development Facility B(PDF-B), coupled with the establishment of the tripartite consultative mechanism will mitigate the hydrogeological transboundary risks that threaten our common water resource and promote sustainable water resources management for the well being of the riparian populations.
5. May I therefore request your honour to commit as soon as possible the formulation of the Strategic Action Programme for the first time in this region for the sustainable management of underground water resources.
6. Please accept the assurances of our highest consideration.



Dr. (Mrs) Grace Ogwuche
Honourable Minister of State

11. Annex E: Monitoring and Evaluation Plan

Table 2: A summary of expected outputs and their delivery (GEF Project Document GEF, 2003b)

Component	Expected outputs	Expected timing of draft submission to UNEP	Expected timing of finalisation and publication
1: Identification of transboundary risk			
1.1	Minutes of the inter-ministerial committee meetings, and country input	-	Two weeks later than the meetings
1.1	Approved TDA	July 2004 (before the final workshop)	October 2004
1.1	Report of the final TDA workshop	-	September 2004
1.2	Computer models with operational guidelines	May 2006	August 2006
1.2	Reports of training on the models	May 2006	August 2006
1.3	Report of the field surveys and institutional set-ups and training	January 2005	April 2005
1.4 (a)	Data table contained in the database and reports of training	January 2005	April 2005
1.4 (b)	Reports of the isotope studies	May 2006	August 2006
1.4 (b)	Reports of the pilot area studies	May 2006	August 2006
Component 2:			
2.1	Reports of the Policy development committees	-	Two weeks after the meetings
2.1	IAH policy and strategy	June 2005 (before the final meeting)	September 2005
2.2	Policy options assessment report	December 2004	February 2005
2.2	Reports of the review committee	-	Two weeks after the meetings
2.2	Adopted legal agreement	March 2006 (before the final inter-governmental meeting)	June 2006
2.2	Report of the final inter-governmental meeting	-	May 2006
2.3	Proposal for IAH monitoring system	December 2005	February 2006

2.3	Report of the pilot monitoring activities	December 2005	February 2006
Component 3:			
3.1a	Reports of stakeholder consultation meetings	-	Two weeks after the meetings
3.1a	Awareness raising materials	January 2005	February 2004
3.1b	Stakeholder assessment report	February 2006	April 2006
3.2	Report of training session on inter-governmental communication tools	September 2005	November 2005
Component 4:			
4.1	Report of mid-term review	December 2004	February 2005
4.1	Report of the terminal evaluation	August 2006	September 2006
4.2a	Report of ISARM reference information	July 2006	September 2006
4.2b	Report of the strengthening of aquifer knowledge community	July 2006	September 2006
4.3	Report of data provision to global database	April 2006	May 2006
Component 5:			
5.1	PSC meeting reports	-	Two weeks after the meetings
5.2	Scientific Coordinating Committee meeting reports	-	Two weeks after the meetings

12. Annex F: Log Frame Matrix showing indicators.

ANNEX 25: LOGFRAME MATRIX¹⁰⁹ (GEF, 2003b)

<u>Development/ Immediate Objectives</u>	<u>Key indicators of impact (objectives) and successful completion (outputs, end of year of completion)</u>	<u>Baseline (at the onset of the project and projections without GEF)</u>	<u>Final Target (Year 3) and other targets during the implementation</u>	<u>Means of verification/Data collection Strategy</u>	<u>Risks and assumptions</u>
<p><u>Overall Objective</u></p> <p>Establish capacity under a sustainable cooperative framework for joint management of risk and uncertainty, to jointly identify, reduce and mitigate transboundary risk from changing land and water use and from climate change in the shared Iullemeden Aquifer System.</p> <p><u>Immediate Objective 1</u> <u>Establish joint</u></p>	<p><u>Process Indicators (PIs)¹¹⁰</u></p> <ol style="list-style-type: none"> 1. Completion of a country endorsed Transboundary Diagnostic Analysis, identifying transboundary concerns, risk and uncertainty; 2. Formulation of a Steering Committee, by governments and supporting organisations; 3. Establishment of a joint basin-wide risk identification and groundwater monitoring mechanism; 4. Establishment of a tripartite policy development committee; 	<p><u>PIs</u></p> <ol style="list-style-type: none"> 1. In-country assessment, but no analysis of transboundary risks and issues; 2. None. 3. In-country monitoring mechanism existing, but not on an IAS scale; 4. In-country water administration, but not on an IAS scale; 5. In the West Africa IWRN Action Plan encourages, but none. 	<p><u>PIs</u></p> <ol style="list-style-type: none"> 1. Yr. 2: A TDA prepared and adopted by participating Governments; 2. Yr. 1: Steering Committee established and functional. 3. Yr. 3: An IAS-wide monitoring mechanism in place with databases and models; personnel trained. 4. Yr. 1: a Tripartite policy development committee established; 5. Yr. 2: An intergovernmental review mechanism developed 	<p><u>PIs</u></p> <ol style="list-style-type: none"> 1. A draft TDA reviewed by UNESCO and UNEP, and a published TDA (OSS); 2. Verified by reports of the Steering Committee meetings (OSS); 3. Verified by reports of the Steering Committee meetings (OSS); 4. Verified by reports by Steering Committee Meeting reports; 5. Verified in reports by FAO to the Steering Committee (FAO and OSS). 	<p>- Participating Governments may change their priorities, and/or may find other more attractive water sources to meet their water demand.</p> <p>- Participating Governments may find the negotiation of policy setting and legislation too lengthy.</p> <p>- Participating Governments may consider the risks and issues too large</p>

¹⁰⁹ This annex of revised logframe matrix has been prepared based on the recommendations of the GEF Council for setting measurable and outcome-oriented indicators. The Annex is, however, subject to further discussion and agreement by the Steering Committee at its first meeting.

¹¹⁰ The indicators for the overall objective of the project are classified into: Process Indicators (PIs), Stress Reduction Indicators (SRIs) and Environmental Status Indicators (ESIs), as defined in A. Duda: Monitoring and Evaluation Indicators for GEF International Waters Projects.

<p>mechanisms and capacity to identify risk and uncertainty issues in the IAS related to land use change in recharge areas and humid zones; climate change with reduced net precipitation; and inappropriate development, extraction and surface based water pollution and salinisation.</p> <p><u>Immediate Objective 2:</u> Establish mechanisms to formulate policies for management of identified risk and uncertainty issues</p> <p><u>Immediate Objective 3:</u> Establish a legal and institutional IAS cooperative framework</p>	<p>5. Establishment of an inter-governmental mechanism to develop a joint legal and institutional IAS cooperative framework;</p> <p>6. Establishment of a result dissemination mechanism through ISARM and IGRAC.</p> <p><u>Stress Reduction Indicators (SRIs)</u></p> <p>1. Number of transboundary hydrogeological risks identified through risk identification database and TDA;</p> <p>2. Number of hydrogeological models developed and personnel trained;</p> <p>3. Proof of land use policies modified and implemented for the recharge areas and humid zones;</p> <p>4. Number of climate change adaptation policies adopted and implemented;</p> <p>5. Public awareness programme implemented;</p> <p>6. Inter-governmental communication programme implemented; and</p> <p>7. Replication plan prepared and implemented through Global GW database.</p> <p><u>Environmental Status Indicators</u></p>	<p><u>SRIs</u></p> <p>1. None identified and agreed;</p> <p>2. ETH model existing, but none trained;</p> <p>3. National land use policies existing.</p> <p>4. None existing.</p> <p>5. No extensive programme existing; and</p> <p>6. No programme for the IAS.</p> <p><u>ESIs</u></p>	<p>and in place.</p> <p><u>SRIs</u></p> <p>1a. Yr. 2: Three Inter-aquifer areas identified;</p> <p>1b. Yr.2: At least five transboundary risks identified based on scientific analysis;</p> <p>2. Yr. 3: Three trained (one from each of the participating countries);</p> <p>3. Yr. 3: Proof of change in land use policies in three countries;</p> <p>4. Yr. 3: a regional climate change adaptation policy on IAS;</p> <p>5. Yr. 3: Public aware programme fully implemented;</p> <p>6. Yr. 3: At least two intergovernmental communication tools in place;</p> <p>7. Yr. 3: a replication strategy in place.</p> <p><u>ESIs</u></p>	<p><u>SRIs:</u></p> <p>1a. Verified in the Steering Committee meeting reports (OSS);</p> <p>1b. Verified in TDA (OSS);</p> <p>2. Verified in ETH report to the Steering Committee (ETH, IRD, OSS);</p> <p>3. Verified in the government documents or legal notice issued by the governments (three governments);</p> <p>4. Verified in reports of the Steering Committee reports;</p> <p>5. Verified in the report of the Steering Committee meeting in terms of the number of stakeholders involved in the public awareness programme;</p> <p>6. Verified in the reports of the Steering Committee meetings;</p> <p>7. Verified through a Steering Committee meeting report.</p> <p><u>ESIs</u></p>	<p>to consider investments.</p>
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	(ESIs) <ol style="list-style-type: none"> Area of salinisation within the IAS A index¹¹¹ indicating groundwater recharge and quality around selected recharge areas and humid zones; and Sustainable water extraction and quality objectives in selected areas. 	<ol style="list-style-type: none"> xxxx ha in 2003 and xxx ha in 2006 without GEF; xxxx in 2003 and xxxx in 2006; Extraction xxxxx and quality yyyyy in location zzzzz in 2003; and extraction xxxxx and quality yyyyy in location zzzzz2 in 2003. 	<ol style="list-style-type: none"> Yr. 3: Xxxx ha; and Yr.7: xxx ha; Yr. 3: xxxxx; Yr. 7: xxxxx Yr. 3: xxx extraction and yyyy quality in zzzz1; and xxxx extraction and yyyy quality in zzzz2. 	<ol style="list-style-type: none"> Monitoring and field survey results to be employed for the indicator. Initial baseline is set with preliminary data available, and will be modified after initial collection of data; Data to be obtained through the field survey and monitoring established in Components 1 and 2; The objectives will be set in Component 2, and to be monitored in monitoring mechanism. 	
<u>Component 1: Identification of Transboundary Risk</u>	<ol style="list-style-type: none"> Establishment of an inter-ministerial TDA committee in each country, which prepared country information and input; Agreed TDA among the countries at the political level; Number of surveyed and agreed transboundary environmental issues related to recharge areas and humid zones; and Number of fully operational models in support of risk identification. Establishment of a digital database for risk identification 	<ol style="list-style-type: none"> None existing; None existing. IRD-HSM supported efforts in baseline field survey ETH modelling work ongoing. IAEA data available. Preliminary identified issues at pilot sites 	<ol style="list-style-type: none"> Yr.1: three inter-ministerial TDA committees established and operational Yr. 2: One TDA approved among the Governments Yr.2: At least five sites surveyed and monitoring mechanism established Yr. 3: Three models fully operation for risk identification by three trained experts Yr. 3: One digital database established Yr. 3: At least three sites surveyed and studied, and monitoring mechanism established. 	<ol style="list-style-type: none"> Verified in each country's report to the Steering Committee on the list of members and the meeting minutes (solicited by OSS) Report of the TDA workshop where TDA is to be adopted (solicited by OSS and submitted to SC) Report from IRD-HSM to the Steering Committee on the site surveys and monitoring mechanisms (OSS) Report from the ETH to the Steering Committee on the modelling and training records (OSS) &6: Report from the IAEA 	<p>- Delays may be caused for organisation of inter-ministerial committees;</p> <p>- TDA development and agreement process may take longer period than is scheduled.</p>

¹¹¹ Water index, comprising of a set of weighted parameters, will be designed as part of the monitoring mechanism and will be agreed at an early stage of the project.

	6. Number of Hydrogeological issues identified and studied			to the Steering Committee to be solicited by OSS	
Component 2: Policy and Institutional Mechanism for Reducing Transboundary Risk (Management Framework)	<p>1. IAS Policy development committee established;</p> <p>2. National-level policy committees established;</p> <p>3. Adopted IAS policy and strategy</p> <p>4. An IAS tripartite agreement concluded.</p> <p>5. Pilot area monitoring system to show changes in baseline</p>	<p>1. None;</p> <p>2. National water administrations;</p> <p>3. None;</p> <p>4. None.</p> <p>5. None</p>	<p>1. Yr. 1: IAS policy committee established;</p> <p>2. Yr. 1: Three national committees established</p> <p>3. Yr. 3: IAS policy and strategy agreed through inter-governmental mechanism</p> <p>4. Yr. 3: legal agreement concluded and signed;</p> <p>Yr. 5: legal agreement ratified by all three countries</p> <p>5. Yr. 3: pilot area monitoring system in place</p>	<p>1. Verified in a report from OSS to the Steering Committee on the establishment;</p> <p>2. Verified in a report from each Government to the Steering Committee on establishment of national committee;</p> <p>3. Verified as the adopted policy document, submitted to the Steering Committee</p> <p>4. Verified by signatures for the agreement to be submitted to the Steering Committee (OSS)</p> <p>5. Verified in OSS report to the Steering Committee (OSS)</p>	<p>- The negotiation of agreed policy and legal instrument may take long term.</p> <p>- Governments may put priority to other international water issues, such as policy development for the Niger River basin.</p>
Component 3: Awareness, Participation and Communication	<p>1. Number of stakeholders approached through the awareness raising programme</p> <p>2. Number of stakeholders actually involved in land and water management</p> <p>3. Number of land and water managers trained through inter-governmental communication tools</p>	<p>1. None</p> <p>2. Main governmental stakeholder involved.</p> <p>3. None.</p>	<p>1. Yr. 3: 50% of the identified major stakeholders approached;</p> <p>2. Yr. 3: 30 stakeholder groups involved in the land and water management;</p> <p>3. Yr. 3: At least twenty managers trained.</p>	<p>1. Verified through sampled interviews conducted and reported upon at the Steering Committee meeting by OSS</p> <p>2. Verified in the reports of the participatory water and land management programme, submitted to the Steering Committee by OSS;</p> <p>3. Verified in the report of the Inter-governmental communication programme to the Steering Committee by OSS; also verified in the records of inter-governmental communications</p>	<p>- Poor establishment of communication strategy would lead to failure in involving stakeholders.</p>

<p><u>Component 4:</u> <u>Project Monitoring and Evaluation, and Data Management</u></p>	<p>1. Project M&E plan established; 2. Project Review; 3. Amount of technical and reference information from ISARM; 4. Amount of data provided to the global groundwater database</p>	<p>1. None. 2. None. 3. ISARM assistance in project formulation. 4. Some basic data available, but not provided to global data centre.</p>	<p>1. Yr. 1: Project M&E plan agreed by SC. 2. Yr. 1.5 and Yr. 3: project review. 3. Yr. 2: ISARM reference information provided (to be specified) 4. Yr. 3: The project results to be provided to the global database (to be specific)</p>	<p>1. Verified in the report of the first meeting of the steering committee; 2. Verified in the mid-term and terminal project review reports, to be issued by UNEP/OSS; 3. Verified UNESCO's report to the second meeting of the steering committee; 4. Verified in the data table on the IAS to be obtained from the global database by UNESCO/OSS.</p>	<p>- Risks may include unclear definition of environmental status indicators. - The IGRAC may not be properly established in time for the project activities.</p>
<p><u>Component 5:</u> <u>Project Coordination and Management</u></p>	<p>1. Project Steering Committee established; 2. Project management office established in OSS; 3. UNESCO Scientific Advisor recruited and operational.</p>	<p>1. None. 2. OSS has basic capacity. 3. UNESCO has provided input to the project formulation.</p>	<p>1. Yr. 1: SC established and having the first meeting in conjunction with the project launching seminar; 2. Yr. 1. Project Management Unit operation in OSS and network with collaborating organisations established; 3. Yr. 1: UNESCO scientific advisor in place, and TOR clearly defined.</p>	<p>1. Verified by the reports of the Steering Committee; 1. Verified in OSS's reports to the steering committee; and 3. Verified by the attendance and records of missions by the Scientific Advisor.</p>	<p>- With so many collaborating organisations, project implementation mechanism becomes too complicated.</p>

13. Annex G: Final Budget Figures in \$US

This section contains tables taken from several emails with Rafik Ziada (OSS Chief Accountant)– December 4 and 25, 2008 and January 12, 2009; and an email of the final budget sent from Sandeep Bhrambra (UNEP Fund Manager), Jan 14, 2009.

FINAL REPORTING SPREAD SHEET sent from Fund Manager Sandeep Bhrambra, Jan 14, 2009

Final Expenditures _27 Nov 2008									
			2004 Actuals	2005 Actuals	2006 Actuals	2007 Actuals	2008 (recon)	Final Q2 2008	Grand Total
10	PROJECT PERSONNEL COMPONENT								
1100	Project Personnel								
	1101	Regional coodinator	16,404	35,728	28,057	81,627	(269)	-	161,547.00
	1102	Financial controller	9,000	7,993	3,996	8,128	(47)	-	29,070.82
	1103	Scientific controller	10,000	8,881	3,996	6,038	(85)	-	28,830.14
		Sub-Total	35,404	52,602	36,050	95,793	(401)	-	219,448
1200	Consultants								
		International Consultants							
	1201	1.1 Transboundary Diagn Analysis	-	6,015	26	922	(482)	-	6,480.86
	1202	2.1 Policy development	-	-	-	3,695	1,024	-	4,718.70
	1203	2.3: Transboundary Monitoring (IRD)	-	-	-	-	-	-	-
	1204	3.1a: Participatory management	-	-	-	-	4,594	1,179.04	5,773.17
		National Consultants							
	1205	1.1 Transboundary Diagn Analysis	-	12,000	1,423	(515)	(908)	-	12,000.00
	1206	2.1 Policy formulation	-	-	-	-	-	-	-
	1207	2.3: Transboundary Monitoring	-	-	-	-	-	-	-
	1208	3.2 Intergovernmental communication	-	-	-	-	7,213	2,628.22	9,841.07
	1209	Modelling Validation	-	-	-	8,118	(5,564)	10,862.59	13,416.87
		Sub-Total	-	18,015	1,448	12,220	5,877	14,670	52,231
1300	Administrative Support								
	1301	Secretary	-	-	-	7,046	(12)	-	7,034.13
		Sub-Total	-	-	-	7,046	(12)	-	7,034
1600	Staff Travel								
	1601	Staff Travel (OSS)	11,976	7,374	(368)	7,206	(2,058)	1,333.46	25,464.12
		Sub-Total	11,976	7,374	(368)	7,206	(2,058)	1,333	25,464
1999	COMPONENT TOTAL		47,380	77,991	37,130	122,266	3,406	16,003	304,177

20	SUB-CONTRACT COMPONENT								
	2200 Sub-Contracts with supporting organisation (NGOs, Govts.)								
	2201 1.2 Modelling Capacity Building (OSS)	-	-	21,946		3,559	-		25,504.59
	2202 1.2 Field Surveys, recharge, discharge areas (IRD-UMR)	-	-				-		-
	2203 3.1b,3.2, 4.2,4.3 Communication (OSS)	-	-				-		-
	2204 Data collection (national Teams)				(14,670)	24,142	-		9,471.79
	Sub-Total	-	-	21,946	(14,670)	27,701	-		34,976
	2300 Sub-contracts with commercial organisations								
	2301 Sub-contracts for local activities	-	249		38	(20)	-		267.02
	Sub-Total	-	249		38	(20)	-		267
	2999 COMPONENT TOTAL	-	249	21,946	(14,632)	27,681	-		35,243
30	TRAINING COMPONENT								
	3200 Group Training								
	3201 1.2 Modelling Capacity Building : 1st Training (Apr-May06)				21,647	5,345	-		26,991.41
	3202 1.2 Modelling Capacity Building : 2nd Training (Nov - Dec 06)				21,733		-		21,733.45
	3203 1.2 Modelling Capacity Building : 3rd Training (Mar-Jun08)						29,292.08		29,292.08
	Sub-Total				-	43,380	5,345	29,292	78,017
	3300 Meetings/Workshops								
	3301 Component 1: Transboundary risk	-	8,484	8,326	41,808	23,833	(5,156.16)		77,294.88
	3302 Component 2: Management framework	-	8,484		-	45,717	7,621.81		61,822.31
	3303 Component 3: Awareness, Communication		-		-	30,545	18,253.12		48,797.88
	3304 Steering Comm Mtgs (2)	-	-	20,990	9,114	1,617	68,785.13		100,505.85
	3305 Transboundary Monitoring/ Regional Workshop (IRD)				-	11,997	-		11,996.65
	3306 Regional w/shop, Tunis Jun08						20,964.36		20,964.36
	Sub-Total	-	16,968	29,316	50,922	113,707	110,468		321,382
	3999 COMPONENT TOTAL	-	16,968	29,316	94,302	119,052	139,760		399,399

40	EQUIPMENT AND PREMISES COMPONENT								
4100	Expendable Equipment								
	4101	Office Supplies	-	-		2,538	3,375	1,483.67	7,396.87
	4102	Computer Software	-	-		3	2,852	3,304.80	6,158.95
		Sub-Total	-	-		2,541	6,226	4,788	13,556
4200	Non-Expendable Equipment								
	4201	Computer Hardware	-	-		7,316	2,225	337.89	9,878.99
	4202	Component 1: computer equipment /software	-	-	5,638	(5,123)	6,279	11,914.09	18,708.45
		Sub-Total	-	-	5,638	2,193	8,504	12,252	28,587
4999	COMPONENT TOTAL		-	-	5,638	4,734	14,730	17,040	42,143
50	MISCELLANEOUS COMPONENT								
5200	Reporting Costs								
	5201	Publications /Outreach / Dissemination				-	3,886	(183.32)	3,702.28
		Sub-Total				-	3,886	(183)	3,702
5300	Sundry								
	5301	Secretariat activity	524	5,144	(931)	7,124	13,283	(11,967.70)	13,176.36
		Sub-Total	524	5,144	(931)	7,124	13,283	(11,968)	13,176
5999	COMPONENT TOTAL		524	5,144	(931)	7,124	17,168	(12,151)	16,879
99	TOTAL BEFORE UNEP PARTICIPATION COSTS		47,904.69	100,351.92	93,099.15	213,794.97	182,037.24	160,653.08	797,841.05
UNEP PARTICIPATION COSTS									
20	SUB-CONTRACT COMPONENT								
2100	Sub-Contracts with cooperating agencies (UN Agency)								
	2101	MoU between UNEP & UNESCO	33,000	-	47,000			-	80,000.00
		Sub-Total	33,000	-	47,000	-		-	80,000
5500	Monitoring and Evaluation								
	5581	Terminal Evaluation (by UNEP)		-		-		30,676.00	30,676.00
		Sub-Total	-	-		-	-	30,676	30,676
99	GRAND TOTAL INCLUDING UNEP PARTICIPATION COSTS		80,904.69	100,351.92	140,099.15	213,794.97	182,037.24	191,329.08	908,517.05

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14. Annex H: Qualifications of Evaluator

Glen Hearn, M.Sc. Ph.D (cand)

Consultant, Compass Resource Management Ltd.

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Vancouver, B.C. Canada V6B 2S8
Tel: (604) 641-2879
Fax: (604) 641-2878
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Overview of Skills

- Strategic and decision analyst with ten years of experience specializing in multi-stakeholder resource management decisions and integrated assessment.
- Policy, legal, and institutional analyst.
- Facilitator, focusing on resolution of conflicts and negotiation, with over ten years experience at various governance levels with communities, local governments, First Nations, international level, and with diverse stakeholder groups.
- Local economic development and participatory planning specialist
- PhD thesis: governance models for shared resource.
- Extensive knowledge in the water resources, genetic resources, fisheries and environmental management.
- Honed communications and research skills, including, writing, presentations, and designing workshops and forums.
- Computer knowledge in database management and analytic tools.

Education

- **Doctor of Philosophy in *Resource Management*** candidate (2003-present), University of British Columbia
- **Masters of Science in *Environmental and Natural Resource Policy*** (1990-1992), International Institute for Hydraulic and Environmental Engineering, Delft, The Netherlands.
- **Bachelor of Applied Science in *Geophysics*** (1983-1988), University of Waterloo, Ontario.

Languages

English, French, Spanish, Portuguese (working knowledge)

Summary of Professional Experience

Associate, Compass Resource Management Ltd., 2007-present

Associate, EcoPlan International Decision, 2004-2007

Water Specialist and Project Coordination, Médecins Sans Frontières 2001-2003

Policy Analyst and dispute resolution, Apodaca Associates, 1999-2000

Research Fellow, Faculty of Law, UBC, 1993-1995

Hydro-geologist, Piteau Associates, 1990

Selected Recent Consulting Assignments

Aquifer Management – Water Use Planning, (2008- on going)

Client and Partner Organization: City of Merritt and Ministry of Environment

Lead consultant: Responsible for developing a multi-objective water use plan for aquifer use in the arid region of British Columbia. This three year initiative involves many different stakeholders and user groups and is only the second such planning initiative in BC.

Collaborative Stewardship – Fish and Wildlife, (2008)

Client and Partner Organization: Ktunaxa First Nation Land Resource Agency

Lead consultant: Responsible for developing a program to promote collaborative stewardship of fish and wildlife between the Ktunaxa and the Province of BC, and the Government of Canada. Literature, interviews and facilitated workshops and meetings were undertaken in conducting the project.

Aquifer Management – Torreon, Mexico, (2008)

Client and Partner Organization: UN Habitat and SEDASOL

Lead consultant: Responsible for developing and delivering a stakeholder process for highlighting action areas in the management of a near surface aquifer accessed by the municipalities of Torreon, Gomez Palacio, Laredo, and Matamoros, with a combined population of 1million people.

British Columbia – Alberta Transboundary Waters (2007-present)

Client and Partner Organization: BC Ministry of Environment

Consultant: Assisting the facilitation of a dialogue group at the provincial level with respect to managing transboundary waters between British Columbia and Alberta. All aspects of transboundary surface and ground-waters are being evaluated and discussed with respect to cooperation in management of water quality, quantity, and ecological integrity. Key elements involve research and analysis of technical problems and their administrative solutions.

Structured Decisions for Rural Care in BC - (2007-present)

Client and Partner Organization: Northern Health

Associate Consultant: Constructed a decision tool for Northern Health to determine care level and strategic options for maternity care in northern BC. The work involved interviews with different stakeholders including, care-givers, local community members, First Nations, Northern Health administration. The objective of the decision tool was to assist management in making complex decisions regarding the level of health care that can be provided in rural British Columbia.

Water Service Strategies for Medium sized Cities – Egypt - (2007)

Client and Partner Organization: UN Development Programme

Lead consultant: Primary consultant assisting local Egyptian teams to analyse and determine strategies for water services and local economic development in medium sized cities in Egypt. As water is a key element to development success in Egypt, the project involved training local teams in the field to conduct a participatory process for determining strategies for water provision in relations to local economic development. Over four years, the project is to develop development programs for 40 medium sized cities.

Nile Basin Information Exchange Agreement – Regional - (2007)

Client and Partner Organization: World Bank

Project Consultant: Responsible for resource analysis component in developing a ‘road map’ for initiating an information exchange agreement among the ten riparian countries of the Nile Basin. Work involved policy analysis as well technical hydrological data to develop a needs assessment and protocol for information exchange. The project is landmark, in that it is the first time in over 15 years of effort that the countries have agreed to move forward on a legal agreement.

Central Asian Water and Energy Commission – Regional - (2007)

Client and Partner Organization: World Bank

Project Consultant: Responsible for reviewing regional water and energy conditions and developing a strategy for conflict avoidance through institutional arrangements, namely the establishment of a Central Asian Water and Energy Commission.

Strategic Planning for Resource and Economic Development – Veracruz, Mexico – (2006-2007)

Client and Partner Organization: UN Habitat / Estado de Veracruz

Lead consultant, designer and facilitator for participative processes for municipal strategies for planning in Xalapa, Pozo Rico, Veracruz, Cordoba-Orizaba, and Coatzacoahuac in Veracruz State, Mexico. Key responsibilities were designing high-level stakeholder engagement processes incorporating decision analysis techniques for prioritisation of actions with respect to water supply and sanitation, municipal waste, and demand-management energy issues.

Nile Basin Negotiation and Decision-Making – Burundi – (2006)

Client and Partner Organization: UN Food and Agriculture Organisation.

Consultant in designing and delivering training workshops for forty negotiators and diplomats in the Nile Basin regarding decision-making for cooperative use of water resources. Key elements of the project were developing simulation tools to ‘replicate’ primary interests of basin states and conduct exercises to employ structured decision making techniques and analytical tools.

City Strategic Economic Development Planning (Strategy Planning and Local Economic and Resource Development,). 2004 to 2008

Lead Consultant: Developed and implemented public participation strategies and training for developing programs stimulating local socio-economic development. Programs involved strategic planning, participatory approaches, decision-making and action prioritization, institutional and governance analysis. Programs were primarily focused on poverty alleviation actions incorporating environmental, social and economic determinants. Strategic policies included water resource, waste policies, energy assessment, green space conservation, municipal services, economic incentive creation, public-private partnerships, developing economic enabling environments, governance and institutional reform, amongst others. Municipalities included:

- **Matamoros, Mexico** - UN-HABITAT Regional Office for Latin America and the Caribbean (Brazil) and SEDSOL.
- **San Jose, Costa Rica** – Municipality of San Jose and UN-HABITAT Regional Office for Latin America and the Caribbean (Brazil)
- **Dar Es Salaam, Tanzania**, Municipality of Dar Es Salaam and Sustainable Cities Initiative, Industry Canada
- **Valparaiso and Vina del Mar, Chile** - SERCOTEC and Sustainable Cities Initiative, Industry Canada
- **Iloilo, Philippines**, - . Municipality of Iloilo and the Canadian Urban Institute

Multi-City Strategic Planning Conference for LED (LED, Strategy Planning, Decision Making) Quito, Ecuador 2005

Client and Partner Organization: UN-HABITAT, GTZ

Lead Consultant: Working with UN-HABITAT to deliver a three-day training event to on strategic planning for LED, including decision analysis and stakeholder engagement. Over 30 municipal officials from 7 different countries participated in the event in conjunction with a larger regional conference on LED and Latin America.

Socio-economic and Environmental Impact for Information Systems (Facilitation, Impact Assessment, and Project Planning)

Honduras 2004

Client and Partner Organization: Radarsat International, McDonald Detweiler, CIDA.

Project Consultant: Working with local partners, conducted a socio-economic and environmental impact assessment of a proposed integrated information system as part of a World Bank project to

facilitate access to land information and tools to assist planning.

Publications

- Hearn, G (2007) Mahakali Treaty: Looking through a new lens at water resource development, in F. Rotberg and A. Swain (eds) *Natural Resources Security in South Asia: Nepal's Water*, Institute for Security and Development Policy, University of Uppsala, Sweden (October, 2007)
- Paisley R, and G Hearn (2006) Lessons Learned and Best Practices from Recent Experiences with the Governance of International Drainage Basins, *Texas Tech Law Journal*, (in press)
- Hearn, G (2003) 'Monsters of the Forest: Fighting Ebola in the Congo', *Médecins Sans Frontières Dispatches*, Spring.
- Hearn, G. (1999) 'Genetic Resources: Law and Morality' in Proceedings of SOS AMAZONAS Symposium, FUNDES; Tomas Cipriano de Mosquera, Bogota November 16-20, 1999.
- Hearn, G. (2000) 'Intangible Fences: Intellectual Property Rights over Genetic Resources for Food and Agriculture', in C. Schofield et al. (ed) *Permeable Borders and Boundaries in a Globalising World: New Opportunities or Old Problems?* International Environmental Law and Policy Series, Graham & Trotman/Martinus Nijhoff.
- Hearn, G. (1998) 'Collective Action for the Protection of the Marine Environment: Experiences from the Baltic and Mediterranean Seas' in *Maritime Co-operation in the Asia Pacific*, AUS-CSCAP.
- Hearn, G. (1997) 'Transboundary Protected Area Coordination: Experiences in Central America and Opportunities in the South China Sea.' in G. Blake *et al.* (ed.) *International Boundaries & Environmental Security: Frameworks for Regional Co-operation*, International Environmental Law and Policy Series, Graham & Trotman/Martinus Nijhoff.
- Hearn, G. and Stormont, W. (1996). Managing Potential Conflicts in the South China Sea, *Marine Policy*, Vol. 20. No. 2. pp. 177-181.
- Hearn, G. and Tyedmers, P. (1995). Poseidon's Trident: Biological Diversity Preservation, Resource Conservation and Conflict Avoidance in the South Chins Sea, in G. Blake *et al.* (ed.) *The Peaceful Management of Transboundary Resources*, International Environmental Law and Policy Series, Graham & Trotman/Martinus Nijhoff.
- Amezaga, J. and Hearn, G.(1991). *Chemical Time Bombs in the Mediterranean*. Mondial Alternative, Periodic Publications Series. Amsterdam. Autumn 1991.

15. Annex I : Terms of Reference for Evaluation

TERMS OF REFERENCE

Terminal Evaluation of the UNEP GEF project

“Managing Hydrogeological Risk in the Iullemeden Aquifer System”

1. PROJECT BACKGROUND AND OVERVIEW

The Iullemeden sedimentary groundwater basin is located in Mali, Niger and Nigeria with minor, non-connected sections in Algeria and Benin. The aquifer basin covers an area of 525 000 km² with 31 000 km² in Mali, 434 000 km² in Niger and 60 000 km² in Nigeria. The basin population of approximately 15 million, with 65 per cent in Niger, 34 per cent in Nigeria and 2 per cent in Mali, is projected to grow to 28 million in 2025. The aquifer system receives substantial modern recharge along its basement fringes in the river valleys with runoff from the bordering highlands in Mali, Niger and Nigeria. The upper Iullemeden aquifer is largely unconfined and recharged locally from rainwater infiltration in permeable sections and concentrated to depressions and humid zones with seasonal or permanent standing water. Over the last 50 years, the land use in the recharge areas has changed and affected the recharge to the upper aquifer. With agriculture expanding into marginal low-rainfall areas and resulting land use change in recharge areas and humid zones the environmental threats and transboundary risks in Iullemeden Aquifer System (IAS) are growing. The adverse impacts are expected to be amplified further from climate change with reduced precipitation and increasing evaporation losses and impacts from declining water levels on the vegetation cover in the humid zones. In addition, the risks for degradation in water quality, with transboundary implications, from salinization, water pollution and inter-aquifer leakage and contaminant transport need to be identified and managed. Management of transboundary issues are subjected to and need to be handled with due recognition of the actual conditions of high scientific, policy and political uncertainty. The principal environmental threats that are common to and will have to be shared between the countries in the IAS, are direct and indirect adverse impacts on the aquifer resources from land use change in recharge areas and humid zones and climatic change with reduced precipitation and increased evaporation. These emerging threats are expected to become aggravated with increased abstractions and environmental degradation of the aquifer resources and result in growing international pressures and water conflict.

Project objectives

Within the goal of sustainable environmental protection and sub-regional and national development, the general objective of the project was to establish capacity under a sustainable cooperative framework for joint management of risk and uncertainty, to jointly identify, reduce and mitigate transboundary risk from changing land and water use and from climate change in the shared Iullemeden Aquifer System.

The immediate objectives of the project were to:

(4) establish joint mechanisms and capacity to identify risk and uncertainty issues in the IAS related to:

- land use change in recharge areas and humid zones,
- climate change with reduced net precipitation, and
- inappropriate development, extraction and surface based water pollution and salinization.

(5) establish mechanisms to formulate policies for management of identified risk and uncertainty issues, and

(6) establish a legal and institutional IAS cooperative framework.

Expected Project Outcomes

- f. Joint mechanisms for identification of transboundary risk issues in the IAS,
- g. Joint mechanisms for policy formulation and implementation to address transboundary risk issues in the IAS,
- h. A joint development and conservation strategy for the IAS,
- i. A joint tripartite legal and institutional cooperative framework for the IAS.
- j. Joint programmes for awareness, participation and inter-government communication

Executing Arrangements

UNEP acted as the implementing agency for this project. The executing agency was the Observatoire du Sahara et du Sahel (OSS). The project is managed by a Project Steering Committee (PSC) with participation from the three participating countries, UNEP as the GEF-IA and the Donors and Cooperating Agencies, representatives of WAWS/ECOWAS as Regional Coordinating Agency for the project and UNESCO/ISARM as principal scientific coordinator and the contact point on Transboundary Aquifer System Management. The existing bi-lateral commissions, (NNJC) and (PCCMN), when called by two members, participated as observers on specific bi-lateral issues in the PSC. For the purpose of inter-project coordination and information sharing, representatives of parallel GEF projects, including the NBA (Niger Basin) and the NNOCC projects, were invited to participate in the PSC meetings and OSS will participated in Steering Committee Meetings. The project was to widen the contacts within and along the margins of the IAS in the sub-region and cooperate with the LADA project and the PDF B on the Fouta Djallon Regional Integrated Development Program. The project was referred under the CDD/STRAP for West Africa coordinated by ECOWAS and CILSS and liaised under the CILSS thematic area of shared water resources.

National Project Committees (NPCs), in Mali, Niger and Nigeria, chaired by the national focal points, normally the national Directors or deputy Director of Hydrology. The NPCs members comprise technical specialist and representatives of the participating national line ministries/sectors, including Water Resources, Environment and Natural Resources and Agriculture and Land Management and Conservation, and national universities and specialised institutes. Multi-stakeholders committees were established and were represented in the NPCs. The three NPCs assigned inter-sectoral representatives to work in a TDA-preparation Team responsible for the joint TDA document. The project considered and drew from the national action programmes including the national CDD programmes in Mali, Niger and Nigeria.

Project Activities

Component 1: Identification of Transboundary Risk.

1. Transboundary Diagnostic Analysis
2. Modelling Capacity Building
3. Field Studies of Aquifer Recharge
4. (a) Establishment of a Common Risk Identification Database; and (b) Targeted Pilot Area Surveys.

Component 2: Policy and Institutional Mechanisms for Reducing Transboundary Risk (Management Framework).

1. Establishment of Mechanisms for Formulation of Risk Reduction Policies and a Joint Development and Conservation Strategy for the IAS:
2. Development of a Joint Legal and Institutional IAS Cooperative Framework: Mechanisms for Transboundary Aquifer Monitoring

Component 3. Awareness, Participation, Communication.

1. Common Public Awareness Program
2. Inter-government Communication Tools

Component 4: Project Monitoring and Evaluation, and Dissemination of Data

1. Project Monitoring and Evaluation
2. 2a. Dissemination of ISARM Reference Information:
2b Strengthening aquifer knowledge community
3. 3a. Inclusion of Project Data in the Global Groundwater Database:
3b Introduction of Data standards and Inter-compatibility

Component 5: Project Coordination and Management.

1. Support to the Project Steering Committee
2. Project Management
3. Scientific Supervision, Support and Coordination

Details on activities are in Annex 6.

Budget

The total budget was US\$ 1,738,200 with US\$ 958,000 funded by the GEF Trust Fund and co-funding of US\$ 780,000.

2. TERMS OF REFERENCE FOR THE EVALUATION

2.1 Objective and Scope of the Evaluation

The objective of this terminal evaluation is to determine the extent to which the project objectives were achieved and assess if the project has led to any other positive or negative consequences. If possible the extent and magnitude of any project impacts to date will be documented and the likelihood of future impacts will be determined. The evaluation will also assess project performance and the implementation of planned project activities and outputs against actual results. The evaluation will focus on the following main questions:

- a. Did the project establish cooperation among the participating countries in addressing the issues related to the shared aquifer system?
- b. Did the project promote scientific approaches as a basis for building cooperation among the countries, including enhanced data information management, analysis of transboundary issues, developing monitoring mechanisms, use of models, etc.?
- c. Did the project increase the capacity of the participating countries in addressing the identified transboundary issues related to the shared aquifer system?
- d. Did the project establish a legal and institutional cooperation framework which can be firmly sustained by the participating countries?

2.2 Methods

This terminal evaluation will be conducted as an in-depth evaluation using a participatory approach. The UNEP/DGEF Task Manager, key representatives of the executing agencies and other relevant staff will be kept informed and consulted throughout the evaluation. The consultant will liaise with the UNEP/EOU and the UNEP/DGEF Task Manager on any logistic and/or methodological issues to properly conduct the review in as independent a way as possible, given the circumstances and resources offered. The draft report will be delivered to UNEP EOU and then circulated to UNEP/DGEF Task Manager and key representatives of the executing agencies. Any comments or responses to the draft report will be sent to UNEP EOU for collation and the consultant will be advised of any necessary or suggested revisions.

The findings of the evaluation will be based on the following:

6. A desk review of project documents including, but not limited to:
 - (a) The project documents, outputs, monitoring reports (such as progress and financial reports to UNEP and GEF annual Project Implementation Review reports) and relevant correspondence.
 - (b) Notes from the Steering Group meetings.
 - (c) Other project-related material produced by the project staff or partners.
 - (d) Relevant material published on the project web site.
7. Interviews with project management and technical support including the staff from the OSS, UNESCO, FAO, IAEA and other project partners;

8. Interviews and Telephone interviews with intended users for the project outputs and other stakeholders involved with this project. The Consultant shall determine whether to seek additional information and opinions from representatives of donor agencies and other organisations. As appropriate, these interviews will be combined with an email questionnaire.
9. Interviews with the UNEP/DGEF project task manager and Fund Management Officer, and other relevant staff in UNEP dealing with International Waters-related activities as necessary. The Consultant shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.
10. Field visit to Mali, Niger and Nigeria.

Key Evaluation principles.

In attempting to evaluate any outcomes and impacts that the project may have achieved, evaluators should remember that the project's performance should be assessed by considering the difference between the answers to two simple questions "*what happened?*" and "*what would have happened anyway?*". These questions imply that there should be consideration of the baseline conditions and trends in relation to the intended project outcomes and impacts. In addition, it implies that there should be plausible evidence to **attribute** such outcomes and impacts **to the actions of the project**.

Sometimes, adequate information on baseline conditions and trends is lacking. In such cases, this should be clearly highlighted by the evaluator, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

2.3 Project Evaluation Parameters

The success of project implementation will be rated on a scale from 'highly unsatisfactory' to 'highly satisfactory'. In particular the evaluation shall **assess and rate** the project with respect to the eleven categories defined below:¹¹²

A. Attainment of objectives and planned results:

The evaluation should assess the extent to which the project's major relevant objectives were effectively and efficiently achieved or are expected to be achieved and their relevance.

- *Effectiveness*: Evaluate how, and to what extent, the stated project objectives have been met, taking into account the "achievement indicators". The analysis of outcomes achieved should include, *inter alia*, an assessment of the extent to which the project has directly or indirectly

¹¹² However, the views and comments expressed by the evaluator need not be restricted to these items.

assisted policy- and decision-makers to apply information supplied by this project. In particular:

- Evaluate the immediate impact of the project on capacity and cooperation for joint management of risk and uncertainty in the shared Iullemeden Aquifer System .
 - As far as possible, also assess the potential longer-term impacts considering that the evaluation is taking place upon completion of the project and that longer-term impact is expected to be seen in a few years time.
- *Relevance*: In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies and the wider portfolio of the GEF?
 - *Efficiency*: Was the project cost effective? Was the project the least cost option? Was the project implementation delayed and if it was, then did that affect cost-effectiveness? Assess the contribution of cash and in-kind co-financing to project implementation and to what extent the project leveraged additional resources. Did the project build on earlier initiatives, did it make effective use of available scientific and / or technical information. Wherever possible, the evaluator should also compare the cost-time vs. outcomes relationship of the project with that of other similar projects.

B. Sustainability:

Sustainability is understood as the probability of continued long-term project-derived outcomes and impacts after the GEF project funding ends. The evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends.

Some of these factors might be outcomes of the project, e.g. stronger institutional capacities or better informed decision-making. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes. The evaluation should ascertain to what extent follow-up work has been initiated and how project outcomes will be sustained and enhanced over time. In particular, the evaluation should determine to what extent the project succeeded in establishing a sustainable joint tripartite legal and institutional cooperative framework for the IAS.

Five aspects of sustainability should be addressed: financial, socio-political, institutional frameworks and governance, environmental (if applicable). The following questions provide guidance on the assessment of these aspects:

- *Financial resources*. Are there any financial risks that may jeopardize sustenance of project outcomes? What is the likelihood that financial and economic resources will not be available once the GEF assistance ends (resources can be from multiple sources, such as the public and private sectors, income generating activities, and trends that may indicate that it is likely that in future there will be adequate financial

resources for sustaining project's outcomes)? To what extent are the outcomes of the project dependent on continued financial support?

- *Socio-political*: Are there any social or political risks that may jeopardize sustenance of project outcomes? What is the risk that the level of stakeholder ownership will be insufficient to allow the project outcomes to be sustained? Do the various key stakeholders see that it is in their interest that the project benefits continue to flow? Is there sufficient public / stakeholder awareness in support of the long-term objectives of the project?
- *Institutional framework and governance*. To what extent is the sustenance of the outcomes of the project dependent on issues relating to institutional frameworks and governance? What is the likelihood that institutional and technical achievements, legal frameworks, policies and governance structures and processes will allow for, the project outcomes/benefits to be sustained? While responding to these questions consider if the required systems for accountability and transparency and the required technical expertise are in place.
- *Environmental*. Are there any environmental risks that can undermine the future flow of project environmental benefits? The TE should assess whether certain activities in the project area will pose a threat to the sustainability of the project outcomes.

C. Achievement of outputs and activities:

Delivered outputs: Assessment of the project's success in producing each of the programmed outputs, both in quantity and quality as well as usefulness and timeliness.

D. Catalytic Role

Replication and catalysis. What examples are there of replication and catalytic outcomes? Replication approach, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated or scaled up in the design and implementation of other projects. Replication can have two aspects, replication proper (lessons and experiences are replicated in different geographic area) or scaling up (lessons and experiences are replicated within the same geographic area but funded by other sources). Specifically:

If no effects are identified, the evaluation will describe the catalytic or replication actions that the project carried out.

E. Assessment of Monitoring and Evaluation Systems.

The evaluation shall include an assessment of the quality, application and effectiveness of project monitoring and evaluation plans and tools, including an assessment of risk management based on the assumptions and risks identified in the project document. The Terminal Evaluation will assess whether the project met the minimum requirements for 'project design of M&E' and 'the application of the Project M&E plan' (see minimum requirements 1&2 in Annex 4). GEF projects must budget adequately for execution of the M&E plan, and provide adequate resources during implementation of the M&E plan. Project managers are also expected to use the information generated by the M&E system during project implementation to adapt and improve the project.

- ***M&E design.*** Projects should have sound M&E plans to monitor results and track progress towards achieving project objectives. An M&E plan should include a baseline (including data, methodology, etc.), SMART indicators (see Annex 4) and data analysis systems, and evaluation studies at specific times to assess results. The time frame for various M&E activities and standards for outputs should have been specified.
- ***M&E plan implementation.*** A Terminal Evaluation should verify that: an M&E system was in place and facilitated timely tracking of results and progress towards projects objectives throughout the project implementation period (perhaps through use of a log frame or similar); annual project reports and Progress Implementation Review (PIR) reports were complete, accurate and with well justified ratings; that the information provided by the M&E system was used during the project to improve project performance and to adapt to changing needs; and that projects had an M&E system in place with proper training for parties responsible for M&E activities.
- ***Budgeting and Funding for M&E activities.*** The terminal evaluation should determine whether support for M&E was budgeted adequately and was funded in a timely fashion during implementation.

F. Preparation and Readiness

Were the project's objectives and components clear, practicable and feasible within its timeframe? Were the capacities of executing institution and counterparts properly considered when the project was designed? Were lessons from other relevant projects properly incorporated in the project design? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project implementation? Were counterpart resources (funding, staff, and facilities), enabling legislation, and adequate project management arrangements in place?

G. Country ownership

This is the relevance of the project to national development and environmental agendas, recipient country commitment, and regional and international agreements. The evaluation will:

- Assess the level of country ownership. Specifically, the evaluator should assess whether the project was effective in catalyzing action taken by the authorities in the countries that received assistance from the project.
- Assess the level of country commitment to facilitating financial and in-kind contributions to the project.

H. Stakeholder participation / public awareness:

This consists of three related and often overlapping processes: information dissemination, consultation, and "stakeholder" participation. Stakeholders are the individuals, groups, institutions, or other bodies that have an interest or stake in the outcome of the GEF- financed project. The term also applies to

those potentially adversely affected by a project. The evaluation will specifically:

- Assess the mechanisms put in place by the project for identification and engagement of stakeholders in each participating country and establish, in consultation with the stakeholders, whether this mechanism was successful, and identify its strengths and weaknesses.
- Assess the degree and effectiveness of collaboration/interactions between the various project partners and institutions during the course of implementation of the project.
- Assess the degree and effectiveness of any various public awareness activities that were undertaken during the course of implementation of the project.

I. Financial Planning

Evaluation of financial planning requires assessment of the quality and effectiveness of financial planning and control of financial resources throughout the project's lifetime. Evaluation includes actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co-financing. The evaluation should:

- Assess the strength and utility of financial controls, including reporting, and planning to allow the project management to make informed decisions regarding the budget and allow for a proper and timely flow of funds for the payment of satisfactory project deliverables.
- Present the major findings from the financial audit if one has been conducted.
- Identify and verify the sources of co-financing as well as leveraged and associated financing (in co-operation with the IA and EA).
- Assess whether the project has applied appropriate standards of due diligence in the management of funds and financial audits.
- The evaluation should also include a breakdown of final actual costs and co-financing for the project prepared in consultation with the relevant UNON/DGEF Fund Management Officer of the project (table attached in Annex 1 Co-financing and leveraged resources).

J. Implementation approach:

This includes an analysis of the project's management framework, adaptation to changing conditions (adaptive management), partnerships in implementation arrangements, changes in project design, and overall project management. The evaluation will:

- Ascertain to what extent the project implementation mechanisms outlined in the project document have been closely followed. In particular, assess the role of the various committees established and whether the project document was clear and realistic to enable effective and efficient implementation, whether the project was executed according to the plan and how well the management was able to adapt to changes during the life of the project to enable the implementation of the project.

- Evaluate the effectiveness and efficiency and adaptability of project management and the supervision of project activities / project execution arrangements at all levels (1) policy decisions: Steering Group; (2) day to day project management in each of the countries.

K. UNEP Supervision and Backstopping

- Assess the effectiveness of supervision and administrative and financial support provided by UNEP/DGEF.
- Identify administrative, operational and/or technical problems and constraints that influenced the effective implementation of the project.

The *ratings will be presented in the form of a table*. Each of the eleven categories should be rated separately with **brief justifications** based on the findings of the main analysis. An overall rating for the project should also be given. The following rating system is to be applied:

HS	= Highly Satisfactory
S	= Satisfactory
MS	= Moderately Satisfactory
MU	= Moderately Unsatisfactory
U	= Unsatisfactory
HU	= Highly Unsatisfactory

2.4 Evaluation report format and review procedures

The report should be brief, to the point and easy to understand. It must explain; the purpose of the evaluation, exactly what was evaluated and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should be presented in a way that makes the information accessible and comprehensible and include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

The evaluation will rate the overall implementation success of the project and provide individual ratings of the eleven implementation aspects as described in Section 1 of this TOR. *The ratings will be presented in the format of a table with brief justifications based on the findings of the main analysis.*

Evidence, findings, conclusions and recommendations should be presented in a complete and balanced manner. Any dissident views in response to evaluation findings will be appended in an annex. The evaluation report shall be written in English, be of no more than 50 pages (excluding annexes), use numbered paragraphs and include:

- An **executive summary** (no more than 3 pages) providing a brief overview of the main conclusions and recommendations of the evaluation;

- ii) **Introduction and background** giving a brief overview of the evaluated project, for example, the objective and status of activities; The GEF Monitoring and Evaluation Policy, 2006, requires that a TE report will provide summary information on when the evaluation took place; places visited; who was involved; the key questions; and, the methodology.
- iii) **Scope, objective and methods** presenting the evaluation's purpose, the evaluation criteria used and questions to be addressed;
- iv) **Project Performance and Impact** providing *factual evidence* relevant to the questions asked by the evaluator and interpretations of such evidence. This is the main substantive section of the report. The evaluator should provide a commentary and analysis on all eleven evaluation aspects (A – K above).
- v) **Conclusions and rating** of project implementation success giving the evaluator's concluding assessments and ratings of the project against given evaluation criteria and standards of performance. The conclusions should provide answers to questions about whether the project is considered good or bad, and whether the results are considered positive or negative. The ratings should be provided with a brief narrative comment in a table (see Annex 1);
- vi) **Lessons (to be) learned** presenting general conclusions from the standpoint of the design and implementation of the project, based on good practices and successes or problems and mistakes. Lessons should have the potential for wider application and use. All lessons should 'stand alone' and should:
 - Briefly describe the context from which they are derived
 - State or imply some prescriptive action;
 - Specify the contexts in which they may be applied (if possible, who when and where)
- vii) **Recommendations** suggesting *actionable* proposals for improvement of the current project. In general, Terminal Evaluations are likely to have very few (perhaps two or three) actionable recommendations.

Prior to each recommendation, the issue(s) or problem(s) to be addressed by the recommendation should be clearly stated.

A high quality recommendation is an actionable proposal that is:

1. Feasible to implement within the timeframe and resources available
 2. Commensurate with the available capacities of project team and partners
 3. Specific in terms of who would do what and when
 4. Contains results-based language (i.e. a measurable performance target)
 5. Includes a trade-off analysis, when its implementation may require utilizing significant resources that would otherwise be used for other project purposes.
- viii) **Annexes** may include additional material deemed relevant by the evaluator but must include:
 1. The Evaluation Terms of Reference,
 2. A list of interviewees, and evaluation timeline
 3. A list of documents reviewed / consulted

4. Summary co-finance information and a statement of project expenditure by activity

5. The expertise of the evaluation team. (brief CV).

TE reports will also include any response / comments from the project management team and/or the country focal point regarding the evaluation findings or conclusions as an annex to the report, however, such will be appended to the report by UNEP EOU.

Examples of UNEP GEF Terminal Evaluation Reports are available at www.unep.org/eou

Review of the Draft Evaluation Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff are allowed to comment on the draft evaluation report. They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks feedback on the proposed recommendations and the preparation of a draft management response to them. UNEP EOU collates all review comments and provides them to the evaluator(s) for their consideration in preparing the final version of the report.

2.5 Submission of Final Terminal Evaluation Reports.

The final report shall be submitted in electronic form in MS Word format and should be sent to:

Segbedzi Norgbey, Chief,
UNEP Evaluation and Oversight Unit
P.O. Box 30552-00100
Nairobi, Kenya
Tel.: (254-20) 7624181
Fax: (254-20) 7623158
Email: segbedzi.norgbey@unep.org

UNEP EOU will then provide copies to:

Maryam Niamir-Fuller
Director
UNEP/Division of GEF Coordination
P.O. Box 30552-00100
Nairobi, Kenya

Tel: + 254-20-7624686
Fax: + 254-20-623158/4042
Email: maryam.niamir-fuller@unep.org

Takehiro Nakamura
UNEP/GEF International Waters SPO
United Nations Environment Programme (UNEP)
Division of GEF Coordination (DGEF)
PO Box 30552-00100
Nairobi, Kenya
Tel: 254 20 7625077
Fax: 254 20 7624041/2
Email: takehiro.nakamura@unep.org

The final evaluation report will be published on the Evaluation and Oversight Unit's web-site www.unep.org/eou and may be printed in hard copy. Subsequently, the report will be sent to the GEF Office of Evaluation for their review, appraisal and inclusion on the GEF website.

2.6 Resources and schedule of the evaluation

This final evaluation will be undertaken by an international evaluator contracted by the Evaluation and Oversight Unit, UNEP. The contract for the evaluator will begin on 18 September 2008 and end on 12 December 2008 (5 weeks spread over 12 weeks (12 days of travel, to Bamako, Abuja and Niamey 17 days desk study and report writing). The evaluator will submit a draft report on 31 October 2008 to UNEP/EOU, the UNEP/DGEF Task Manager, and key representatives of the executing agencies. Any comments or responses to the draft report will be sent to UNEP / EOU for collation and the consultant will be advised of any necessary revisions. Comments to the final draft report will be sent to the consultant by 28 November 2008 after which, the consultant will submit the final report no later than 12 December 2008.

The evaluator will after an initial telephone briefing with EOU and UNEP/GEF conduct initial desk review work and later travel to meet with representatives of the project executing agencies and the intended users of project's outputs.

In accordance with UNEP/GEF policy, all GEF projects are evaluated by independent evaluators contracted as consultants by the EOU. The evaluator should have the following qualifications:

The evaluator should not have been associated with the design and implementation of the project in a paid capacity. The evaluator will work under the overall supervision of the Chief,

Evaluation and Oversight Unit, UNEP. The consultant should have the following minimum qualifications: (i) experience in groundwater-related issues; (ii) experience with management and implementation of projects and in particular with policy-related assessments that generate knowledge and information; (iii) experience with project evaluation. Knowledge of UNEP programmes and GEF activities is desirable. Field experience in the arid and semi-arid areas an advantage. Fluency in oral and written English and French is a must. _

2.7 Schedule Of Payment

Lump-Sum Option

The evaluator will receive an initial payment of 30% of the total amount due upon signature of the contract. A further 30% will be paid upon submission of the draft report. A final payment of 40% will be made upon satisfactory completion of work. The fee is payable under the individual Special Service Agreement (SSA) of the evaluator and is **inclusive** of all expenses such as travel, accommodation and incidental expenses.

In case, the evaluator cannot provide the products in accordance with the TORs, the timeframe agreed, or his products are substandard, the payment to the evaluator could be withheld, until such a time the products are modified to meet UNEP's standard. In case the evaluator fails to submit a satisfactory final product to UNEP, the product prepared by the evaluator may not constitute the evaluation report.

20th August 2008

15.1 Annex 1. OVERALL RATINGS TABLE

Criterion	Evaluator's Summary Comments	Evaluator's Rating
A. Attainment of project objectives and results (overall rating) Sub criteria (below)		
A. 1. Effectiveness		
A. 2. Relevance		
A. 3. Efficiency		
B. Sustainability of Project outcomes (overall rating) Sub criteria (below)		
B. 1. Financial		
B. 2. Socio Political		
B. 3. Institutional framework and governance		
B. 4. Environmental		
C. Achievement of outputs and activities		
D. Monitoring and Evaluation (overall rating) Sub criteria (below)		
D. 1. M&E Design		
D. 2. M&E Plan Implementation (use for adaptive management)		
D. 3. Budgeting and Funding for M&E activities		
E. Catalytic Role		
F. Preparation and readiness		
G. Country ownership / drivenness		
H. Stakeholders involvement		
I. Financial planning		

Criterion	Evaluator's Summary Comments	Evaluator's Rating
J. Implementation approach		
K. UNEP Supervision and backstopping		

RATING OF PROJECT OBJECTIVES AND RESULTS

Highly Satisfactory (HS): The project had no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Satisfactory (S): The project had minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Satisfactory (MS): The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Unsatisfactory (MU): The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Unsatisfactory (U) The project had major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Highly Unsatisfactory (HU): The project had severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Please note: Relevance and effectiveness will be considered as critical criteria. The overall rating of the project for achievement of objectives and results **may not be higher** than the lowest rating on either of these two criteria. Thus, to have an overall satisfactory rating for outcomes a project must have at least satisfactory ratings on both relevance and effectiveness.

RATINGS ON SUSTAINABILITY

A. Sustainability will be understood as the probability of continued long-term outcomes and impacts after the GEF project funding ends. The Terminal evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends. Some of these factors might be outcomes of the project, i.e. stronger institutional capacities, legal frameworks, socio-economic incentives /or public awareness. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes..

Rating system for sustainability sub-criteria

On each of the dimensions of sustainability of the project outcomes will be rated as follows.

Likely (L): There are no risks affecting this dimension of sustainability.

Moderately Likely (ML). There are moderate risks that affect this dimension of sustainability.

Moderately Unlikely (MU): There are significant risks that affect this dimension of sustainability

Unlikely (U): There are severe risks that affect this dimension of sustainability.

According to the GEF Office of Evaluation, all the risk dimensions of sustainability are deemed critical. Therefore, overall rating for sustainability will not be higher than the rating of the dimension with lowest ratings. For example, if a project has an Unlikely rating in any of the dimensions then its overall rating cannot be higher than Unlikely, regardless of whether higher ratings in other dimensions of sustainability produce a higher average.

RATINGS OF PROJECT M&E

Monitoring is a continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing project with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds. Evaluation is the systematic and objective assessment of an on-going or completed project, its design, implementation and results. Project evaluation may involve the definition of appropriate standards, the examination of performance against those standards, and an assessment of actual and expected results.

The Project monitoring and evaluation system will be rated on ‘M&E Design’, ‘M&E Plan Implementation’ and ‘Budgeting and Funding for M&E activities’ as follows:

Highly Satisfactory (HS): There were no shortcomings in the project M&E system.

Satisfactory(S): There were minor shortcomings in the project M&E system.

Moderately Satisfactory (MS): There were moderate shortcomings in the project M&E system.

Moderately Unsatisfactory (MU): There were significant shortcomings in the project M&E system.

Unsatisfactory (U): There were major shortcomings in the project M&E system.

Highly Unsatisfactory (HU): The Project had no M&E system.

“M&E plan implementation” will be considered a critical parameter for the overall assessment of the M&E system. The overall rating for the M&E systems will not be higher than the rating on “M&E plan implementation.”

All other ratings will be on the GEF six point scale.

GEF Performance Description	Alternative description on the same scale
HS = Highly Satisfactory	Excellent
S = Satisfactory	Well above average

MS = Moderately Satisfactory	Average
MU = Moderately Unsatisfactory	Below Average
U = Unsatisfactory	Poor
HU = Highly Unsatisfactory	Very poor (Appalling)

15.2 Annex 2. Co-financing and Leveraged Resources

Co-financing (basic data to be supplied to the consultant for verification)

Co financing (Type/Source)	IA own Financing (mill US\$)		Government (mill US\$)		Other* (mill US\$)		Total (mill US\$)		Total Disbursement (mill US\$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
- Grants										
- Loans/Concessional (compared to market rate)										
- Credits										
- Equity investments										
- In-kind support										
- Other (*)										
-										
-										
-										
-										
-										
Totals										

* Other is referred to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries.

Leveraged Resources

Leveraged resources are additional resources—beyond those committed to the project itself at the time of approval—that are mobilized later as a direct result of the project. Leveraged resources can be financial or in-kind and they may be from other donors, NGO’s, foundations, governments, communities or the private sector. Please briefly describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project’s ultimate objective.

Table showing final actual project expenditure by activity to be supplied by the UNEP Fund management Officer. (insert here)

15.3 Annex 3

Review of the Draft Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff provide comments on the draft evaluation report. They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks agreement on the findings and recommendations. UNEP EOU collates the review comments and provides them to the evaluators for their consideration in preparing the final version of the report. General comments on the draft report with respect to compliance with these TOR are shared with the reviewer.

Quality Assessment of the Evaluation Report

All UNEP GEF Mid Term Reports are subject to quality assessments by UNEP EOU. These apply GEF Office of Evaluation quality assessment and are used as a tool for providing structured feedback to the evaluator.

The quality of the draft evaluation report is assessed and rated against the following criteria:

GEF Report Quality Criteria	UNEP EOU Assessment	Rating
A. Did the report present an assessment of relevant outcomes and achievement of project objectives in the context of the focal area program indicators if applicable?		
B. Was the report consistent and the evidence complete and convincing and were the ratings substantiated when used?		
C. Did the report present a sound assessment of sustainability of outcomes?		
D. Were the lessons and recommendations supported by the evidence presented?		
E. Did the report include the actual project costs (total and per activity) and actual co-financing used?		
F. Did the report include an assessment of the quality of the project M&E system and its use for project management?		
UNEP EOU additional Report Quality Criteria	UNEP EOU Assessment	Rating
G. Quality of the lessons: Were lessons readily applicable in other contexts? Did they suggest prescriptive action?		
H. Quality of the recommendations: Did recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?'). Can they be implemented? Did the recommendations specify a goal and an associated performance indicator?		
I. Was the report well written? (clear English language and grammar)		

J. Did the report structure follow EOU guidelines, were all requested Annexes included?		
K. Were all evaluation aspects specified in the TORs adequately addressed?		
L. Was the report delivered in a timely manner		

GEF Quality of the MTE report = 0.3*(A + B) + 0.1*(C+D+E+F)

EOU assessment of MTE report = 0.3*(G + H) + 0.1*(I+J+K+L)

Combined quality Rating = (2* 'GEF EO' rating + EOU rating)/3

The Totals are rounded and converted to the scale of HS to HU

Rating system for quality of terminal evaluation reports

A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1, and unable to assess = 0.

15.4 Annex 4 GEF Minimum requirements for M&E

15.5 Minimum Requirement 1: Project Design of M&E¹¹³

All projects must include a concrete and fully budgeted monitoring and evaluation plan by the time of Work Program entry (full-sized projects) or CEO approval (medium-sized projects). This plan must contain at a minimum:

- SMART (see below) indicators for project implementation, or, if no indicators are identified, an alternative plan for monitoring that will deliver reliable and valid information to management
- SMART indicators for results (outcomes and, if applicable, impacts), and, where appropriate, corporate-level indicators
- A project baseline, with:
 - a description of the problem to address
 - indicator data
 - or, if major baseline indicators are not identified, an alternative plan for addressing this within one year of implementation
- An M&E Plan with identification of reviews and evaluations which will be undertaken, such as mid-term reviews or evaluations of activities
- An organizational setup and budgets for monitoring and evaluation.

¹¹³ <http://gefweb.org/MonitoringandEvaluation/MEPoliciesProcedures/MEPTools/meptstandards.html>

15.6 Minimum Requirement 2: Application of Project M&E

- Project monitoring and supervision will include implementation of the M&E plan, comprising:
- Use of SMART indicators for implementation (or provision of a reasonable explanation if not used)
- Use of SMART indicators for results (or provision of a reasonable explanation if not used)
- Fully established baseline for the project and data compiled to review progress
- Evaluations are undertaken as planned
- Operational organizational setup for M&E and budgets spent as planned.

SMART INDICATORS GEF projects and programs should monitor using relevant performance indicators. The monitoring system should be “SMART”:

1. **Specific:** The system captures the essence of the desired result by clearly and directly relating to achieving an objective, and only that objective.
2. **Measurable:** The monitoring system and its indicators are unambiguously specified so that all parties agree on what the system covers and there are practical ways to measure the indicators and results.
3. **Achievable and Attributable:** The system identifies what changes are anticipated as a result of the intervention and whether the result(s) are realistic. Attribution requires that changes in the targeted developmental issue can be linked to the intervention.
4. **Relevant and Realistic:** The system establishes levels of performance that are likely to be achieved in a practical manner, and that reflect the expectations of stakeholders.
5. **Time-bound, Timely, Trackable, and Targeted:** The system allows progress to be tracked in a cost-effective manner at desired frequency for a set period, with clear identification of the particular stakeholder group to be impacted by the project or program.

15.7 Annex 5: List of intended additional recipients for the Terminal Evaluation (to be completed by the IA Task Manager)

Name	Affiliation	Email
Aaron Zazueta	GEF Evaluation Office	azazueta@thegef.org
Government Officials		
GEF Focal Point(s)		
Executing Agency		
Implementing Agency		
Carmen Tavera	UNEP DGEF Portfolio Manager	

15.8 Annex 6

Project Activities anticipated at the time of the project inception

Component 1: Identification of Transboundary Risk. The Component, at a total cost of US\$ 555 000 (GEF: US\$ 185 000, Co-financing/associated projects: US\$ 370 000), carried out in project months 2 to 36 and included (5) activities. Government in-kind contributions was US\$ 75 000.

5. Transboundary Diagnostic Analysis: at a total cost of US\$ 90 000, (GEF: US\$90 000), planned for project months 5 to 11,
6. Modelling Capacity Building: at a total cost of US\$ 30 000, (GEF: US\$ 30 000,), planned for project months 2 to 36,
7. Field Studies of Aquifer Recharge: at a total cost of US\$ 85 000, (GEF: US\$ 65 000, Co-financing: US\$ 20 000), planned for project months 2 to 20,
8. (a) Establishment of a Common Risk Identification Database; and (b) Targeted Pilot Area Surveys: at a total cost of US\$ 350 000 (Co-financing/associated project: US\$ 350 000), planned for project months 3 to 21 and project months 7-36 respectively.

Component 2: Policy and Institutional Mechanisms for Reducing Transboundary Risk (Management Framework). The Component, at a total cost of US\$ 450 000 (GEF: US\$ 150 000, Co-financing/associated project: US\$ 300 000),planned for project months 10 to 27 and included (3) activities. Government in-kind contributions are US\$ 42 000.

3. Establishment of Mechanisms for Formulation of Risk Reduction Policies and a Joint Development and Conservation Strategy for the IAS: The Component, at a total cost of US\$ 125 000 (GEF: US\$ 125 000), planned for project months 18 to 26,
4. Development of a Joint Legal and Institutional IAS Cooperative Framework: The Component, at a total cost of US\$ 300 000 (Co-financing/associated project: US\$ 300 000), planned for project months 10 to 27,
5. Mechanisms for Transboundary Aquifer Monitoring The Component, at a total cost of US\$ 25 000 (GEF: US\$ 25 000), planned for project months 18 to 30

Component 3. Awareness, Participation, Communication. The Component, at a total cost of US\$ 133 000 (GEF: US\$ 133 000), planned for project months 16 to 34 and included (2) activities. Government in-kind contributions was US\$ 18 000.

3. Common Public Awareness Program: at a total cost of US\$ 78 000, (GEF: US\$ 78 000), planned for project months 16 to 34, together with 1b Introduction of Experience/References from other GEF projects: at a total cost of US\$5 000 (Co-financing US\$5 000), will be carried out starting in project month 18,
4. Inter-government Communication Tools: at a total cost of US\$ 50 000, (GEF: US\$ 50 000), planned for project months 22 to 28.

Component 4: Project Monitoring and Evaluation, and Dissemination of Data: The Component, at a total cost of US\$ 95 000 (GEF: US\$ 30 000, Co-financing: US\$ 65 000),

carried out over the full project duration, project months 1 to 36, and included (3) activities. Government in-kind contributions was US\$ 16 500.

4. Project Monitoring and Evaluation: at a total cost of US\$ 30 000, (GEF: US\$ 30 000), carried out over the full duration of the project,

5. 2a. Dissemination of ISARM Reference Information: at a total cost of US\$ 20 000, (Co-financing: US\$ 20 000), carried out throughout the project with dissemination of project experience and data in project months 34 to 36, and 2b Strengthening aquifer knowledge community, at a total cost of US\$ 10 000 (GEF: US\$ 10 000),

6. 3a.Inclusion of Project Data in the Global Groundwater Database: at a total cost of US\$ 30 000, (Co-financing: US\$ 30 000), planned for project months 26 to 32, and 3b Introduction of Data standards and Inter-compatibility: at a total cost of US\$ 5 000 (GEF: US\$ 5 000)

Component 5: Project Coordination and Management. The Component, at a total cost of US\$ 445 000 (GEF: US\$ 445 000), carried out over the project duration, project months 1 to 36, and included (3) activities. Government in-kind contributions are US\$ 18 000.

4. Support to the Project Steering Committee: at a total cost of US\$ 111 000,

5. Project Management (Annex 13): at a total cost of US\$ 254 000,

6. Scientific Supervision, Support and Coordination (Annex 13): in project months 1 to 36, total cost US\$ 80 000.