



**UNITED NATIONS DEVELOPMENT GROUP
IRAQ TRUST FUND**

Programme Cover Page

Participating UN Organisation(s): UNESCO	Sector Outcome Team(s): Water and Sanitation
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Programme Title: Advanced Hydrogeological Survey for Sustainable Groundwater Development in Iraq (Phase I)	Programme Number: E3-19

Programme Description (limit 1,000 characters):

A preliminary assessment of existing knowledge of hydrogeological resources in Iraq will be undertaken in order to enhance the government's understanding and management of Iraq's hydrogeological resources. The project will collect, collate and interpret available in-country data on the physical groundwater occurrence and related hydrogeological regimes and dynamics, which are currently dispersed throughout government institutions. An inventory of data, maps and database will be produced, along with an analysis of gaps in data and current knowledge. National capacities in the collection, processing and management hydrogeological data will be enhanced through the establishment and training of a team of experts, and through its involvement in the project activities. The inventory of data, analysis and skills built during this phase will enhance government capacities in managing groundwater and other hydrogeological resources, and also provide a preliminary baseline for a subsequent advanced survey of hydrogeological resources (Phase II).

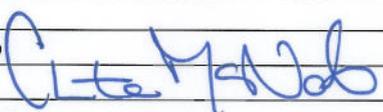
Programme Costs:		Programme Location:	
UNDG ITF:	\$675,000	Governorate(s):	Nationwide
Govt. Contribution:		District(s):	
Agency Core:		Town(s)	
Other:			
TOTAL:	\$675,000		

Govt of Iraq Line Ministry Responsible:
Ministry of Water Resources

Programme Duration:
Total # of months: 6
Expected Start date: 01 July 2010
Expected End date: 31 December 2010

Review & Approval Dates
Line Ministry Endorsement Date: 08 April 2010
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SOT Approval Date: 06 June 2010
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Steering Committee Approval Date: 27 June 2010

Signatures of Agencies and Steering Committee Chair

I.	Name of Representative	Mohammad Djelid
	Signature	
	Name of Agency	UNESCO
	Date	27.6.2010
II.	Name of Steering Committee Chair	Christine McNab
	Signature	
	Date	27 June 2010

National priority or goals (NDS 2007- 2010 and ICI):

NDS: 7.1 Improving the Quality of Life (Goal 1: Mitigation of poverty and hunger; Goal 6: providing full access to water

10.2: Improving Iraq's Intra-Government Process

ICI Benchmarks:

4.6. To support the development of the agriculture sector to achieve food security, generate employment, diversify the economy and preserve the countryside.

4.4.1.5: Preserve Iraq's environment and ensure careful exploitation of its natural resources for the benefit of all citizens; Improve access to water and sanitation by one third

Sector Team Outcome(s): 3. GoI is able to manage WATSAN sector in an effective manner

Integrated Programme/Project Outcome(s):

Outcome 1: GoI is able to manage WATSAN sector in an effective manner

**Detailed Breakdown of Budget by Source of Funds and
Distribution of Programme Budget by Participating UN Organisation**

Participating UN Organisation	Portion from Budget (US \$)
UNESCO	\$ 675,000
Total Budget (US \$)	\$ 675,000

Total budget (in US \$):	\$ 675,000
Sources:	
• Government	\$0
• ITF (WATSAN sector, balance of EC 3 rd tranche)	\$ 328,629
• ITF (unearmarked)	\$ 346,371
<u>UN Core/non-core sources</u>	
• UN Org (specify: _____)	\$ _____

1. Executive Summary

Water, soils and geological formations beneath Iraq's surface (hydrogeological resources) are increasingly subject to critical long-term vulnerabilities and risks. Intensifying extraction rates, persistent drought conditions and unsustainable management practices have placed considerable stress on Iraq's aquifers—the sub-surface reservoirs on which much of Iraq's agriculture and rural settlements depend—bringing them to critically low levels. Promoting an integrated management of groundwater – which focuses on the sustainable use of Iraq's hydrogeological resources – is crucial to mitigating the pressures (i.e. shortages, drought, contamination) currently being placed on Iraq's hydrological system as a whole.

Actions to promote a more integrated approach, such as precision-well digging, well-logging, and managed aquifer recharge, must be informed by sound science and knowledge. While a wealth of knowledge on Iraq's groundwater, soils and sub-surface geology does exist, much of it is outdated, based on conventional modeling techniques and dispersed among a number of government agencies, preventing a full understanding of the current state of these resources. Before updating this knowledge with new, advanced observation techniques, such as geospatial remote-sensing technologies, an inventory of existing knowledge must be produced and analyzed in order to establish a preliminary baseline.

This project aims to conduct an assessment of existing knowledge of hydrogeological resources in Iraq in order to establish a baseline of hydrogeological knowledge in Iraq. Two project outputs will be achieved: 1) the Government of Iraq will have an inventory of hydrogeological data in Iraq, and (2) the Government will have improved capacities for the collection, processing and management of hydrogeological data. These deliverables will serve as the preparatory assistance phase (Phase I) for the implementation of a subsequent national survey of hydrogeological resources using advanced geospatial remote-sensing and exploration techniques (Phase II).

Key deliverables of the project include: A centralized database of existing hydrogeological resource data in Iraq; a preliminary report analyzing collected data; data gaps identified; an analysis of current understanding of Iraq's hydrogeological resources; and a plan for implementing an advanced hydrogeological survey (Phase II). To enhance national capacities in data management, an inter-ministerial/academic team of hydrogeological experts will be established and trained in collecting, processing and managing hydrogeological data.

This project will contribute to the achievement of specific national and international development goals: (1) NDS 7.1 “mitigation of poverty and hunger”, (2) ICI Goals 4.6 “To support the development of the agriculture sector to achieve food security, generate employment, diversify the economy and preserve the countryside;” 4.4.1.5: “Preserve Iraq's environment and ensure careful exploitation of its natural resources for the benefit of all citizens; Improve access to water and sanitation by one-third” (3) UNCT Water and Sanitation Sector (2008-2010) Outcome: “GoI is able to manage WATSAN sector in an effective manner.”

The programme will be executed and managed by the UNESCO Iraq Office, in coordination with the Federal Ministry of Water Resources (MoWR). Radar Technologies International (RTI) will serve as the key implementing partner for this project, providing specialized, technical inputs and interpretation. A multi-disciplinary team of Iraqi experts will be trained with the purpose of assisting UNESCO and RTI in implementing data collection and assessment.

The project has a planned duration of six (6) months, and a budget of US \$675,000.

2. Situation Analysis

2.1. A hydrological system under pressure

Iraq's hydrological system has undergone dramatic change over the past 30 years, driven primarily by pressures related to rising demand for a resource of increasingly limited supply. A shortage of perennial surface water in recent years has meant that reservoirs, lakes and rivers are diminished to critical levels. The Tigris and the Euphrates rivers, the country's primary source of water, have fallen to less than a third of normal capacity. With national storage capacity dropping to around 9 per cent of full capacity in December 2009, the government estimates that it is down to 20 per cent of its reserves. According to the Ministry of Water Resources, close to two million Iraqis faced severe drinking water shortages by the end of 2009.

The stress on the system has impacted agriculture to the extent that Iraq has shifted from being a prominent wheat exporter to being the world's largest importer of wheat. Poor irrigation and drainage methods have led to considerable wastage in water resources, highlighted by the fact that over 90% of Iraq's water is currently used for an agricultural sector that provides for less than a quarter of the country's food needs.

With variability of precipitation expected to intensify over time, the risk of scarcity is increasing. Since 2007, precipitation levels declined in most of Iraq's 18 governorates. Equally deficient was the snow melt from the Zagros Mountains, a potential sign that the climate is changing, with negative consequences for the future supplies of Iraq's water. Iraq also depends greatly on precipitation falling outside its borders (53% dependency ratio for all of its water), meaning that surface water supplies are significantly vulnerable to climate events and storage projects occurring in Turkey, Syria and Iran.

A growing population and the need to quench the thirst of agriculture and industry will require greater amounts of water and, according to some estimates, are expected to increase demand on the Tigris and Euphrates rivers by over one-third by 2020. The nation's conveyance and storage infrastructure, consisting of canals, wells, pumping stations, dams and reservoirs, are insufficient to meet current demand even at full capacity. At current rates, the ongoing storage and withdrawal policies in the region threaten to deprive Iraq of the water needed to irrigate a third of its agricultural land, just as demand for water increases by a third.

2.2. Groundwater

With only 25% of Iraq being irrigated by surface water, large areas of the country are solely dependent on water stored beneath the surface. As rivers and reservoirs run low on the surface, the dependence on sub-surface resources to the national supply tends to increase. Groundwater remains neglected as a stable, managed resource partly because it is invisible and difficult to monitor, and partly because the data for understanding it are currently limited. Still, it is estimated that groundwater resources account for up to 30% of Iraq's water, and therefore should be considered an important factor for achieving sustainable water resources management.

Despite this potential, however, there are signs emerging that show that groundwater resources are under threat. Wells, springs and traditional aqueduct systems, known as karez, are drying up especially in the more rain-dependent northern region. Drought and over-extraction have caused water tables in many areas to decline, preventing natural replenishment of the aquifers. Many shallow aquifers are reported to have been severely contaminated by agricultural and industrial effluent. In the South, these phenomena have encouraged seawater to intrude.

In an attempt to offset water shortages, the government turned to depend more on groundwater, encouraging more exploitation of the aquifer. In 2004, the KRG relaxed its laws regulating the amount of water that communities could pump from the aquifer, leading to an increase in competition among neighbours to exploit shared resources. During the peak of drought (2007-2009), the Federal Government commissioned the excavation of over 1,000 new wells. Several existing wells were dug deeper than 250m to try to reach the sinking water tables, sometimes reaching "fossil", non-renewable aquifers. Lacking accurate knowledge of current aquifer conditions, these interventions yielded only limited returns in volume, and may have actually contributed to the decline of the water table and increased the risk of aquifer collapse. Also, few measures were implemented that promoted the replenishment of aquifers.

Urgent measures are needed to protect groundwater and the associated hydrogeological system (water, soils, geology) from further degradation and to improve government capacities to manage these resources more sustainably.

2.3. Updating hydrogeological information for improved management of groundwater

To meet these challenges, a greater emphasis on managing Iraq's groundwater resources more sustainably is required. Decisions concerning the exploration and exploitation of aquifers should strive to be taken in balance with general public interest, and informed by sufficient and sound hydrogeological data. At present, government policies are based on a sizeable wealth of national expertise and studies. In Baghdad, data are housed by different agencies, such as the Ministry of Water Resources, the Ministry of Agriculture and State Company of Geological Survey and Mining. The Ministry of Oil also has geological and seismic records valuable for deep-water exploration. In Erbil, the KRG Ministry of Agriculture and Water Resources and KRG Ministry of Natural Resources have their own thematic, regional studies. A number of international references on groundwater and geological resources are available. Several Iraqi academic institutions, such as Baghdad University and the University of Salahaddin, also house data. These sources have not been collated into a single assessment.

Notwithstanding this wealth of Iraqi expertise in hydrogeology, water management decisions are taken using data that is modeled on traditional scientific tools and methods. Studies are outdated and current science contains significant spatial and temporal gaps (eg. transboundary and fracture conveyance), producing less than optimal results for planning, monitoring and exploitation. Because information is disjointed across different agencies, a comprehensive and integrated assessment is currently difficult to achieve. Current understanding of Iraq's groundwater availability and dynamics is incomplete, and needs updating through the use of modern techniques.

Before undertaking an advanced hydrogeological survey that would update government knowledge, however, there is a clear need to take stock of the current understanding of sub-surface resources by collating records and data on hydrogeological resources to form a more complete inventory. Historical and current knowledge of hydrogeological resources – mapping historical trends and sub-surface phenomena –are crucial inputs for a robust and accurate hydrogeological survey. From the establishment of such an inventory, a greater understanding of not only the resource itself, but also information about the government's collective knowledge (gaps, metadata, etc.) will be gained. This Phase I will establish the baseline and plans for the subsequent advanced survey of hydrogeological resources (Phase II).

3. Lessons Learned, NDS and ICI Relevance, Cross-Cutting Issues, and Agency Experience in Iraq/in the Sector

3.1. Background/Context

Integrating and analyzing Iraq's otherwise fragmented hydrogeological knowledge will make significant contributions to enhancing the government's understanding of its resources and addressing a number of international and national development priorities. Integrated data will deliver crucial improvements in agricultural efficiency by improving understanding of aquifer levels and identifying areas appropriate for agricultural development. This will make a significant contribution towards achieving MDG Goal 1: End poverty and hunger, as well as NDS 7.1, Goal 1: Mitigation of Poverty and Hunger and ICI Goal 4.6, supporting the development of agriculture.

Improved data and enhanced data management capacities will allow the government Iraq to develop an integrated groundwater management strategy, thus contributing to MDG Goal 7, target 1 and 7c. More precise knowledge of Iraq's hydrogeological resources will 'ensure careful exploitation of its national resources for the benefit of all,' thus addressing ICI Benchmark 4.4.1.5.

Broadly, the results of this project will enhance knowledge of Iraq's hydrogeological resources within the UN and other development actors and provide the raw data needed to build solid evidence based development programmes. This will provide Iraq and its partners with the tools to address a wide array of other development goals, including MDG Goal 7, Target 1 and 7c.

3.1.1. Lessons learned

The level of government capacity to implement, though a key target of UNESCO interventions, is a challenge for project implementation. The experience has been felt particularly in previous projects, including the ITF project that UNESCO is implementing, "Rehabilitation and Conservation of Karez systems in Northern Governorates", where the intended implementation by the government has required reinforcement through other means, such as monitoring, contracting to other partners, to ensure outputs are within the standards of quality needed. The organization will undertake and plan for more government training that targets skills for direct implementation, as well as involve a wide range of government and local stakeholders to promote assimilation of skills learned.

Where possible, relying on UNESCO's global sphere and experience in assisting member states in the sciences is an asset for designing responses in Iraq. More collaboration from UNESCO's scientific network should be made to address areas such as the Marshlands, drought, renewable energies, and policy formulation.

The water sector in Iraq is a complex, evolving, yet urgent, issue that requires constant monitoring and involvement. The government needs urgent assistance. Resources, both human and financial, should be devoted to ensure that the organization is present and providing authoritative assistance and advice on hydrological and water management issues.

Future programming will take into account the immediate needs and gaps on the ground, as well as the current political situation, in order to enhance impact. Iraq's environment is always changing, and requires close monitoring of data, indicators and close collaboration with key government and stakeholders.

3.2. Assessment of Cross-Cutting Issues

Human Rights – Improved understanding of the location and dynamics of Iraq's hydrogeological resources could serve as a catalyst for humanitarian response aimed at improving access to water in drought-afflicted communities.

Gender Equality – The project does not directly contribute to gender equality. However, improved knowledge of water resources with respect to the proximity of communities should indirectly contribute to the reduction of the burden placed upon women and children in collecting water.

Environment – This project will encourage environmental sustainability by enhancing the government's knowledge of, and capacity to manage, Iraq's hydrogeological resources. Current understanding of Iraq's hydrogeological resources is disjointed and incomplete, and Iraq's experts lack a centralized database to produce integrated analyses of Iraq's hydrogeological resources. Data collected and analyzed can be utilized to enact measures to protect groundwater and the associated hydrogeological systems, as well as other sensitive ecological systems, such as the Marshlands.

Employment generation – No direct employment will be generated by this project.

3.3. Agency Experience in Iraq/in the Sector:

UNESCO Iraq responded to growing water scarcity and management needs through two projects supported by the UNDG ITF. The first project, "Capacity Building in Water Institutions in Iraq" (US\$ 3.2 Million, funded through the UNDG Trust Fund), began in August 2004 and was completed in December 2006. The second UNDG ITF project, "Rehabilitation and Conservation of Kahrez system in Northern Governorates" (US\$ 1.6 Million, under the UNDG Iraq Trust Fund), began in spring 2007 and will conclude early 2010. More specifically, UNESCO will apply its expertise and technical capacity as the UN agency specialized in

groundwater resources management, and in assisting member states in observing and monitoring groundwater for sustainable management.

Where possible, relying on UNESCO's global sphere and experience in assisting member states in the sciences is an asset for designing responses in Iraq. This is exemplified, for example, in the advice and involvement by the UNESCO International Center for Qanats and Historical Hydraulic Systems (ICQHS) in the karez project. This project will utilize UNESCO's water training expertise through its Institute for Water Education (UNESCO-IHE, Delft, the Netherlands). UNESCO's 'water family', comprised of the International Hydrological Programme, World Water Assessment Programme, UNESCO water-related Chairs and specialized international and regional centers for hydrology, will also contribute valuable expertise and scientific networking opportunities.

4. The Proposed Programme

4.1. Main objectives (outputs)

(1) GoI has an inventory of hydrogeological resources in Iraq

The project's central output is an inventory of existing knowledge of sub-surface water resources in Iraq. Existing hydrogeological data and documentation will be collected through consultations and field visits conducted by UNESCO and RTI, involving government agencies.

UNESCO and RTI, in collaboration with an Iraqi team of experts, will then collate, centralize and interpret available in-country data on the physical groundwater occurrence and related hydrogeological regimes and dynamics. An inventory of data, maps and database will be produced, along with an analysis of gaps in data and current knowledge. The purpose of the inventory is to identify data gaps in government knowledge of sub-surface water resources. In addition, the inventory will improve the government's understanding of both historical and current levels of groundwater resources. In collaboration with the Government and academic experts, UNESCO and RTI will utilize the newly established data inventory and preliminary report to identify data needs and priorities.

National priorities in groundwater assessment and management will be established at a workshop organized by UNESCO with leading Iraqi hydrogeological and policy experts. UNESCO's inventory and assessment of currently available data is further intended to provide the baseline for the implementation of a subsequent survey of hydrogeological resources using advanced geospatial remote-sensing and exploration techniques (Phase II). A roadmap for the implementation of an advanced hydrogeological survey will be developed.

The key deliverables of the inventory include:

- (i.) A centralized database of existing hydrogeological resources data*
- (ii.) Preliminary report assessing the data collected and identifying gaps*
- (iii.) Needs based analysis report based on technical workshop and government consultations*
- (iv.) Plan of implementation for the advanced hydrogeological survey (Phase II)*

(2) GOI has improved capacities for hydrogeological data collection, processing and management

In parallel to establishing an inventory of current groundwater knowledge, the project aims to build government capacities in hydrogeological data management systems and techniques. An inter-ministerial and academic team of hydrogeological experts will be established to assist UNESCO in establishing the data inventory, identifying

national data needs and developing a plan of implementation for the national hydrogeological survey in Phase II. The team will be composed of experts from each participating ministry and will harmonize government coordination and knowledge of hydrogeological resources. UNESCO will provide the team with technical training in data collection, processing and management to enhance the government's ability to establish and manage data systems crucial to achieving integrated groundwater resources management.

A three-week course tailored to the project and delivered by the UNESCO-IHE Institute for Water in Delft, will enhance capacities of 15 government experts in: 1) explaining the principles and methods of stream flow measurements, 2) collecting routine measurements using hydrometeorological instruments, 3) designing and analyzing networks for operational data collection and archiving; 4) processing the data into a usable format for further analysis and comparison; and 5) analyzing data, extract information and to present and discuss the results.

The key capacity-building deliverables include:

- (i.) *Creation of an inter-ministerial/academic team of experts*
- (ii.) *Team of experts able to collect, process and manage hydrogeological data*

4.2. Modalities

a. Integration of existing data and expertise

The project will rely on all available in-country expertise and data to form a baseline of knowledge. UNESCO and RTI, in collaboration with relevant ministries in Baghdad and Erbil, will collect and collate data from government, academic institutes, studies and the private sector. Data in Iraq are widely dispersed, therefore, Government involvement and facilitation in the collection of data, granting of permission to UNESCO and RTI to access government records, are essential. Relevant ministries include: Ministries of Water Resources (MoWR), Agriculture (MoA), Industry (State Company of Geological Survey and Mining), Oil (MoOil); and KRG Ministries of Agriculture and Water Resources (KRG MoAWR), Natural Resources (KRG MoNR). The Ministry of Planning and Development Cooperation (MoPDC) and KRG Ministry of Planning play a vital role in facilitation of this data collection process, as well as ensuring the integration of data from the respective statistics and information bureau (COS and KRSO). Universities and key researchers in Iraq also have data and information to contribute, and line ministries can facilitate these linkages, particularly the Ministry of Higher Education and Scientific Research (MoHESR). The MoOil, MoIndustry and KRG MoNR can facilitate data collection from private sector partners, namely petroleum and mining companies which may have useful data. Overall, this process is a vital step in the project that involves many parties and requires sound coordination to be successful.

The project will also coordinate with and utilize available data from other sources, including international agencies. UNESCO will closely coordinate data sharing with the Information and Analysis Unit (IAU) of the UNCT Iraq.

b. Government ownership

Participation and involvement of government authorities in all stages of the project, from data collection to planning, to ownership and implementation of inventory outputs, is essential. Once delivered, the data will be owned by the Government. UNESCO will assist the Government in instituting the appropriate controls to ensure the safety and integrity of the data. UNESCO will assist the government in developing the appropriate criteria and controls for access by third parties to the database.

All participating ministries in the Project Steering Committee have already confirmed their willingness to provide UNESCO with the requested data and assist in project implementation. With regards to implementation of a phase II hydrogeological survey, the government has expressed its intent to co-share funding and continued involvement beyond the first phase.

c. Equipment

All data will be delivered on two computer servers, which will be installed within the Ministry of Water Resources in Baghdad and the KRG Ministry of Agriculture and Water Resources (KRG MoAWR) in Erbil, respectively. All relevant ministries will have ability to add their own data in the future and access the current database. Specifications of the computer servers must meet the expected capacity load and allow adequate access and usage.

4.3. Key Partner

Radar Technologies International (RTI): UNESCO conducted an extensive review of international hydrogeological surveying firms, which resulted in the pre-selection of RTI as an implementing partner. Key considerations for the selection of RTI include: 1) RTI's WATEX technology is unrivaled among surveying technologies and analytical capabilities, 2) RTI's extensive track-record in hydrogeological data collection and surveying in conflict and post-conflict areas in collaboration with international agencies, including UNESCO, UNHCR, UNICEF, ICRC and USAID, 3) the firm's unique expertise and over 20 years experience in hydrology, mining and oil exploration: the ideal combination for integrated hydrogeological survey and identifying deeper aquifers in Iraq, 4) the need for accurate and appropriate data inputs for an advanced hydrogeological survey, and 5) the firm's outstanding credentials, as demonstrated by its scientific certification by the United States Geological Survey (USGS) and the European Union.

RTI is a private engineering firm specialized in precision observation and monitoring of the natural environment. RTI's expertise is in analyzing groundwater, fossil fuel and base metal observations. RTI has developed a unique and patented exploration tool called the WATEX Hydrogeological System which is capable of accurately and efficiently pinpointing within a few meters the location, nature, and potential of aquifers, watersheds and sub-watershed sources hundreds of meters underground.

RTI's experience in data collection and knowledge of the required data inputs for an advanced survey will be utilized for the implementation of Phase I. The unique data collection and surveying technologies developed by the firm harmonize data spread across various agencies into an integrated and interactive database that can be shared with all stakeholders. RTI will provide unique data management software and hardware that will ensure a smooth transition to the survey and identify data gaps and needs. Having a wide array of data outputs also means that other sectors will benefit, such as agriculture, national security, higher education, science and technology, mineralogy and land management.

4.4. Beneficiaries

The direct beneficiaries include those government agencies and entities that will benefit from the new data. These include the key line-ministries (MoWR, KRG MoAWR) and their associated bodies and authorities, as well as other ministries such as MoA, MoOil, MoIndustry, MoPDC, KRG MoP, and KRG MoNR. Being a valuable planning tool, the centralized database will aid in government-wide planning for future hydrogeological studies. Furthermore, the wealth of data made centrally accessible will allow the government and its development partners to take immediate steps needed address Iraq's growing water scarcity.

Indirectly, academia, relief agencies, private sector and the general population will benefit from the project's outputs. The wealth of raw and interpreted data that the project will produce will have the potential to spur scientific research in many areas, contributing to the knowledge of groundwater flow dynamics, composition, assessment, exploration and management. Decisions about projects run by relief agencies or exploration companies, particularly about their proximity to water and mineral resources, will be facilitated. Broadly, the results of this project will enhance knowledge of Iraq's hydrogeological resources within the UN and other development actors and provide the raw data needed to build solid evidence based development programmes in the sector.

5. Results Framework

This project is the first phase of a UNESCO-led project titled “Advanced Hydrogeological Survey for Sustainable Groundwater Development in Iraq.” It assesses existing hydrogeological resources, identifies data gaps and needs, and builds government capacities in data management for the purpose of developing a sustainable and feasible plan for a nationwide hydrogeological survey.

This project will begin with UNESCO and RTI, in collaboration with an established inter-ministerial/academic team of hydrogeological experts, conducting field visits to collect existing hydrogeological data that is currently fragmented and dispersed among various government ministries and academic institutions. This data will be collated, organized and centralized into a single database, to be housed on two separate high-tech servers at the MoWR and KRG MoAWR. In parallel, the inter-ministerial/academic team will be trained in advanced hydrogeological data collecting and processing techniques to ensure project sustainability and results. Training will be provided by the UNESCO-IHE Institute for Water Education in Delft, Netherlands.

Utilizing the newly established inventory of data, UNESCO and RTI will produce a preliminary report and accompanying maps. Analysis will be undertaken to identify hydrogeological data gaps. UNESCO will organize a workshop attended by the inter-ministerial/academic team of experts to analyze the assessment report and data inventory to determine national data needs and priorities. Disseminated to all participating government ministries, this report will enhance understanding of current capacities and capabilities in hydrogeological data management. Finally, UNESCO and the Government will utilize the findings of this project to convene a national workshop with technical and policy experts and draft a plan of implementation for Phase II, an “Advanced Hydrogeological Survey for Sustainable Groundwater Development in Iraq”, at the end of which it is anticipated the plan will be approved for implementation.

Table 1: Results Framework and Indicators

Programme Title:	Advanced Hydrogeological Survey for Sustainable Groundwater Development in Iraq (Phase I)						
NDS/ICI priority/ goal(s):	NDS 7.1: Improving the Quality of Life (Goal 1: Mitigation of poverty and hunger; Goal 6: providing full access to water) 10.2: Improving Iraq's Intra-Government Process ICI Benchmarks: Section 4.6. To support the development of the agriculture sector to achieve food security, generate employment, diversify the economy and preserve the countryside. 4.4.1.5: Preserve Iraq's environment and ensure careful exploitation of its natural resources for the benefit of all citizens; Improve access to water and sanitation by one third						
UNCT Outcome	Improved and equitable access to essential social services.						
Sector Outcome	GoI is able to manage WATSAN sector in an effective manner						
JP Outcome 1	GoI is able to manage WATSAN sector in an effective manner			NDS / ICI Priorities: Same as above			
JP Outputs	UN Agency Specific Output	UN Agency	Partner	Indicators	Source of Data	Baseline Data	Indicator Target
Output 1.1: GOI has an inventory of hydrogeological resources in Iraq	GOI has an inventory of hydrogeological resources in Iraq	UNESCO	RTI, MoWR, MoIM, MoOil, MoA, MoPDC, KRG MoAWR, KRG MoNR and KRG MoP.	Database for hydrogeological resources in Iraq designed	Database report	No	Yes
				Preliminary data interpretation and gap analysis report prepared	Analysis Report	No	Yes
				Number of technical experts from participating ministries and policy makers participating in data analysis workshop	Workshop report	0	20
				Need based analysis report identifying data gaps and priorities	Report	NO	Yes
				Number of technical experts and policy makers, ministries, and academic institutions participating in planning workshop	Workshop report	0	20

				Plan of implementation drafted	Plan	No	Yes
<p>JP Output 1.2:</p> <p>GOI has improved capacities for hydrogeological data collection, processing and management</p>	<p>GOI has improved capacities for hydrogeological data collection, processing and management</p>	<p>UNESCO</p>	<p>RTI, MoWR, MoIM, MoOil, MoA, MoPDC, KRG MoAWR, KRG MoNR and KRG MoP.</p>	<p>A team of 20 Iraqi experts as a partner for data collection of phase 1 and 2 is established</p>	<p>Project progress report</p>	<p>0</p>	<p>20-technical experts from participating ministries and academic institutions.</p>
				<p>Number of technical experts from participating ministries and academic institutions trained and certified on hydrological data collection, processing and management</p>	<p>Training report</p>	<p>0</p>	<p>20</p>
				<p>Percentage of trainees fully satisfied with the quality of the training in terms of relevance and usefulness</p>	<p>Post training participants' assessment</p>	<p>NA</p>	<p>80%</p>

6. Management and Coordination Arrangements

The programme will be executed and managed by the UNESCO Iraq office in Amman, Jordan, in coordination with the Ministry of Water Resources (MoWR). The UNESCO international Programme Manager will conduct frequent missions to Baghdad and Erbil to oversee, facilitate and manage the data collection process. A UNESCO National Program Officer (NPO) will act as the chief UNESCO liaison in Baghdad, coordinating the national data collection efforts of RTI and the expert team, and communicating directly with participating government ministries.

RTI will serve as the key implementing partner for this project. RTI will provide all necessary resources (expertise, interpretation, etc) needed to collect the data and will work with UNESCO to produce analysis to effectively utilize the results of the inventory. RTI is charged with leading a team of Iraqi experts in collecting, collating and centralizing Iraq's hydrogeological data.

A Programme Steering Committee (PSC) will be established to steer the efforts of UNESCO and relevant ministries in Baghdad and the KRG. The PSC will ensure the linkage of the project outputs and implementation to government led projects in agriculture and other relevant sectors. The PSC will assist in nominating and ensuring the qualifications of appropriate experts for membership in the inter-ministerial/academic team. The PSC will be co-chaired by the MoWR and KRG MoAWR, and comprised of officials appointed from the Ministries of: Planning and Development Cooperation, Agriculture, Industry, Oil and the KRG Ministries of Planning and of Natural Resources. The PSC will remain intact after this first phase, to oversee the larger programme once funds are realized.

An inter-ministerial/academic team of Iraqi hydrogeological experts will be established to aid RTI in project implementation and collect data through field visits. The team will work in parallel with RTI to collate collected data and manage the newly established inventory.

The MoWR will be the key government partner in this project, who will coordinate with UNESCO in project administration and management. MoWR will host the inter-ministerial/academic team of Iraqi hydrogeological experts and the centralized database upon its completion. MoWR will aid RTI and the team of experts in obtaining data from other ministries.

Data in Iraq are widely dispersed, therefore, ministry involvement and facilitation in the collection of data is essential. Relevant ministries include: Ministries of Agriculture (MoA), Industry (State Company of Geological Survey and Mining), Oil (MoOil); and KRG Ministries of Agriculture and Water Resources (KRG MoAWR), Natural Resources (KRG MoNR). The Ministry of Planning and Development Cooperation (MoPDC) and KRG Ministry of Planning play a vital role in facilitation of this data collection process, as well as ensuring the integration of data from the respective statistics and information bureaus (COSIT and KRSO).

Universities and key researchers in Iraq also have data and information to contribute, and line ministries can facilitate these linkages, particularly the Ministry of Higher Education and Scientific Research (MoHESR). The MoOil, MoIndustry and KRG MoNR can facilitate data collection from private sector partners, namely petroleum and mining companies which may have useful data.

7. Feasibility, risk management and sustainability of results

7.1. Feasibility

As a leading agency in hydrology science and technology, UNESCO has extensive experience in supporting Member States improve their management and knowledge of water resources (including groundwater and surface modeling), and in ensuring that governments utilize technological methods of the highest international

standards. UNESCO has implemented a number of country level projects around the world in hydrogeological data collection and management; experience that will provide invaluable insights during the implementation of this project.

RTI has developed extensive skills in providing hydrogeological data collection and surveying services for humanitarian and development purposes. The firm has worked in Africa, Middle East and Central Asia, as well as in post-conflict countries, with a number of international agencies such as USAID, UNHCR and UNESCO. In Sudan and Chad, UNESCO and RTI collaborated to collect data and surveyed hydrogeological resources.

The GoI, through its participation in the Programme Steering Committee, has confirmed its desire and capacity to collaborate with UNESCO in implementing the project. With UNESCO and RTI's unique set of capacities and the collaboration of the Government, feasibility will be ensured.

7.2. Project Risks

Successful implementation of this project rests largely upon the active participation and coordination of Government ministries and the willingness of the Government to release data to UNESCO and RTI field consultants. Each participating ministry must provide UNESCO high-level permission to access and collect requested data. In this regard, all participating ministries in the Project Steering Committee have already confirmed their willingness to provide UNESCO with the requested data and assist in project implementation. UNESCO will seek coordination assistance from MoPDC and KRG MoP, as well as support from the Office of the Prime Minister to ensure the disclosure of required data. To further encourage government cooperation and ownership, the project will utilize the inter-ministerial/academic team of experts to communicate with the government and gather data.

This project provides a baseline of data and analysis that will benefit a subsequent advanced hydrogeological survey. Implementation of such survey is contingent to raising sufficient funds. The outputs and activities of Phase I avoid dependency on securing funds for Phase II, and has thus been designed as a "stand-alone" project, producing outputs that can be utilized for an advanced hydrogeological survey as well as a spectrum of other water related projects and activities. Upon the completion of the programme, the GoI will have an inventory of all hydrogeological resources in knowledge in Iraq, knowledge that will allow the government and its partners to take immediate steps to address individual development priorities. Importantly, Phase I will provide the GoI with the capacity to fill the identified data needs and gaps, even if Phase II does not materialize.

The deteriorating security situation has been identified as a leading risk to successful project implementation. UNESCO will manage this risk by utilizing national staff, as well as implementing partners, who have the local capacity to operate under difficult security conditions. UN staff are governed by DSS and will implement the project within those parameters; local partners have experience operating under difficult conditions as they relate to security and have developed their own strategies to ensure continued implementation; beneficiaries will ultimately choose whether they can participate in activities or not.

7.3. Long-term sustainability

The pursuit of improved groundwater management does not end with new skills, data and equipment. A vital component of the project is the assurance of the long-term sustainability of its objectives. In this regard, the project incorporates four specific components:

(a) Improved government capacities for hydrogeological data collection, processing and management

Data collection and management is crucial for policy makers to broaden their understanding of Iraq's hydrogeological resources and serve as the foundation for sustainable integrated water resources

management (IWRM). A main component of this project is to train the GoI in the crucial capacities of data management to ensure the ability of experts to maintain and update Iraq's knowledge of its hydrogeological resources in the future. Selected experts from the GoI will undergo an intensive, three-week 'Hydrogeological data collection and processing' course, tailored specifically to GoI needs and delivered at the UNESCO-IHE Institute for Water Education. The course will ensure sustainable government capacities in data management and will provide the skills for government officials to design and analyze future networks for operational data collection and archiving of hydrogeological resources.

(b) Enhanced knowledge of Iraq's water resources through the establishment and interpretation of an integrated hydrogeological database

The hydrological science community in Iraq has long been hampered by a lack of coordination and data synthesis. The establishment of an integrated database will provide a wealth of raw and interpreted data that will revitalize the sector and encourage new scientific collaboration and research. The new knowledge of data and data gaps produced by this programme will enhance government planning and capacities for IWRM. Moreover, Iraq's development partners and other relevant stakeholders will be able to utilize the database for enhanced response to Iraq's water needs.

(c) Establishment of an inter-ministerial/academic team of hydrogeological experts

Upon the initiation of the project, an inter-ministerial/academic team of Iraqi hydrogeological experts will be established to assist the implementation of the project enhance national data collection, processing and management capacities. The creation of the team will ensure government ownership and encourage collaboration between government and academic experts for future data collection and management needs.

(d) 'Phase II' – An Advanced Hydrogeological Survey for Sustainable Groundwater Development in Iraq

This project will produce a roadmap for the implementation of an advanced hydrogeological survey in Iraq. The advanced survey will take the baseline inventory and insights established by this Phase I project, as it's starting point, and will aim to update the Government's knowledge of groundwater resources and soils. Outputs of Phase II will enable the Government to better respond to increasing water scarcity while improving agricultural development. In addition to providing a wealth of new data, Phase II will improve government capacities in the interpretation, exploration, and sustainable exploitation of hydrogeological resources through the establishment of a management system that will include the provision of advanced training, remote-sensing equipment and mechanisms data management and mapping. Phase II will be implemented immediately following the completion of Phase I, rolled out over a period of 15 months.

8. Monitoring, Evaluation, and Reporting

The UNESCO Iraq office will be responsible for project monitoring and reporting. Internally, this means that the project will have its own Monitoring and Evaluation Plan as per UNESCO standards, against which progress towards the project outcomes (measured against the indicators) is entered and recorded, along with other pertinent data. The responsible Project Manager will produce an internal monitoring report every month and a detailed report after the first three months and the completion of the project, to be shared with all partners, and reviewed with the UNESCO Iraq M&E officer.

In the field, the project focal points (the National Programme Officer/NPO) dedicated to the project will meet each month with the inter-ministerial/academic team of experts to review progress towards the outcomes, with meetings between the NPO and separate Ministry focal points occurring monthly.

In addition, RTI (an implementing partner) will provide a technical progress report to UNESCO bi-monthly. The report will detail the progress of project work-plan, key findings to date, and implementation hurdles the project may be facing. The aim of the report is to identify any concerns related to the successful completion of the preliminary assessment and project objectives, to ensure coordination across relevant stakeholders, and to ensure the compliance with output goals and modalities outlined by the project document.

As mentioned above, UNESCO will produce a progress report upon completion of the 3rd month (mid-term). The report will review the progress of the project, including an assessment of initial data collection from existing sources, stakeholder coordination and creation of the database. The main purpose of this report is to ensure successful transition to second stage of the project as well as to identify any project amendments needed for the successful completion of project goals.

A final report, compiled by UNESCO, will cover the entire project period (6 months) and will be finalized upon the completion of all activities. Reporting will be in accordance with UNDG ITF rules and regulations in addition to UNESCO's rules and regulations. Accordingly, all financial reports, annual narrative progress reports, quarterly fiches, and project completion report will be prepared and directly submitted to the MDTF office.

Monitoring and Evaluation Plan

Description of the Performance Indicators	Base Lines	Targets	Data / Information to be collected	When (should data /information be collected)	Methods of data / information collection	Responsible person (for data /information collection)
1.1.1. Number of data collected from participating govt	0	TBD	Data indices, submission forms	Monthly status update	Consultations, monthly meetings with team of experts	Project manager, RTI
1.1.3. Database established	0	1	Official confirmation	3 rd month	Receipts, photos, delivery report	Project manager, RTI
1.2.1. Gap analysis report delivered	0	1	Report received	Monthly status update	Communication with receiving agency	Project manager
2.1.1. Number of technical experts and policy makers involved in workshop;	0	15	List of participants	Monthly status update	Workshop report received	Project manager
2.1.2. Need-based analysis report	0	1	Official confirmation	Monthly status update	Communication with receiving agency	Project manager
2.2.1. Number of technical experts and policy makers involved in workshop;	0	20	List of participants	Monthly status update	Workshop report received	Project manager
2.2.2. Plan of Phase II implementation delivered	0	1	Official endorsement	Monthly status update	Communication with receiving agency	Project manager
3.1.1. Number of ministries/agencies involved;	0	10 (including KRG)	Letters of ministry engagement	Monthly status update	Monthly status updates	Project manager
3.1.2. Number of experts involved in team	0	25	Meeting minutes, list of participants	Monthly status update	Monthly status updates	Project manager
3.2.1. Number of technical experts trained and certified in collecting, processing and managing hydrogeological data	0	15	Course certificates, participation evaluations	Monthly status update	Communication with course partner	Project manager

9. Work Plans and budget

Work Plan for: Advanced Hydrogeological Survey for Sustainable Groundwater Development in Iraq (Phase I)

Period Covered by the Work Plan : July – Dec 2010

Sector Outcome (s): GoI is able to manage WATSAN sector in an effective manner					
JP Outcome(s): GoI is able to manage WATSAN sector in an effective manner					
UN Organization-specific Annual targets	Major Activities	Time Frame (by activity)		Implementing Partner	PLANNED BUDGET (by output)
		Q1	Q2		
IP Output 1.1: GOI has an inventory of hydrogeological resources in Iraq					459,800
	Collection and collation of existing data and documentation	●		RTI	
	Creation of hydrogeological database	●		RTI, Participating Ministries	
	Data Interpretation	●		RTI, Participating Ministries	
	Gap Analysis	●		RTI, Participating Ministries	
	Preliminary Report	●		RTI	
	Maps produced	●		RTI	
	Govt. consultations		●	RTI	
	Technical workshop with hydrogeological experts		●	RTI, Participating Ministries	
	Workshop with technical and policy experts		●	RTI, Participating Ministries	
	Plan delivered		●	RTI	
IP Output 1.2: GOI has improved capacities for hydrogeological data collection, processing and management					215,200
	Establishment of an inter-ministerial/academic team of experts	●		RTI, Participating Ministries	
	Hydrogeological data collection and processing course, UNESCO-IHE	●		RTI, Participating Ministries	
Total Planned Budget					\$675,000

PROGRAMME BUDGET

PROGRAMME BUDGET		ESTIMATED UTILIZATION OF RESOURCES (US\$)
CATEGORY	AMOUNT (US\$)	2010
1. Supplies, commodities, equipment and transport	63,074	63,074
2. Personnel (staff, consultants and travel)	120,632	120,632
3. Training of counterparts	225,000	225,000
4. Contracts	215,000	215,000
5. Other direct costs	12,313	12,313
Total Programme Costs	636,019	636,019
Indirect Support Costs	38,981	38,981
TOTAL	675,000	675,000

UNESCO detailed Budget

Budget Category	Item Description	Unit	Unit Cost	Qty	Total Budget US\$	UNESCO BL
1. PERSONNEL						
1.1 National Programme/Project Personnel						
	National Professional Officer (NPO-A, Baghdad)	Person	4,000	3	12,000	11
	Sub-Total				12,000	
1.2 International Programme Personnel						
	Programme Manager (ALD-P3-A, Erbil)	Person	9,022	6	54,132	11
	Programme Specialist (ALD-P2-A)	Person	7,000	3.5	24,500	11
	Sub-Total				78,632	
1.3 National Consultants						
1.4 International Consultants						
	Sub-Total				90,632	
2. CONTRACTS						
	RTI Fee	Set	136,000	1	136,000	20
	Preliminary Data Report	set	12,000	1	12,000	20
	Data Analysis Report and Maps	Set	40,000	1	40,000	20
	Report Translations	unit	30	500	15,000	20
	Phase II Plan Report	set	12,000	1	12,000	20
	Sub-Total				215,000	
3. TRAINING						
	Gap Analysis Workshop (15 experts)	Event	35,000	1	35,000	30
	Hydro Plan Workshop (10 experts + 10 policy makers)	Event	40,000	1	40,000	30
	UNESCO-IHE Data Training Course (20 participants)	Event	7,500	20	150,000	30
	Sub-Total				225,000	
4. EQUIPMENT						
	Database Servers and Management Software	Set	25,000	2	50,000	40
	Office equipment	Set	2,500	2	5,000	40
	Sub-Total				55,000	
5. SUPPLIES & COMMODITIES						
7. TRAVEL						
	Data Collection and field visits	Unit	15,000	2	30,000	10
	Sub-Total				30,000	
8. MONITORING AND EVALUATION						
	Audit and final evaluation report	unit	15,000	1	15,000	
	Sub-Total				15,000	
8. PROGRAMME/PROJECT SUB-TOTAL					615,632	
9. MISCELLANEOUS (Should Not Exceed 3% of BL 8)						
	Telecom and Courier	Set	8,074	1	8,074	
10. SECURITY (Should Not Exceed 2% of BL 8)					1	
	Travel of UN Staff	Mission	5,000	5,000	10,000	50
	RTI, staff security and insurance	Set	2,313	1	2,313	50
	Sub-Total				12,313	
11. AGENCY MANAGEMENT SUPPORT COST					38,981	
12. PROGRAMME/PROJECT BUDGET TOTAL					675,000	

Budget Narrative

1. Personnel

1.1. National Staff: USD 12,000

- 1 National Professional Officer based in Baghdad to coordinate and manage data collection, to liaise with national authorities and provide technical/logistical support. Unit Cost USD \$4,000 x 3 months = \$12,000.

1.2. International Programme Personnel: USD 78,632

- 1 Programme Manager (ALD-P3-A), based in Amman, with frequent missions to Baghdad and Erbil to manage implementation of project. Unit cost USD \$9,022 x 6 months = \$54,132
- 1 Programme Specialist (ALD-P2-A), to assist programme manager in project implementation and provide technical support for data processing and collation. Unit cost USD \$7,000 x 3.5 months = \$24,500.

2. Contracts

2.1. RTI Fee: USD 136,000

- RTI expertise and services, including collection, collation, analysis and dissemination of hydrogeological data. Unit cost: USD \$17,833 x 6 months: \$107,000.
- RTI travel, security and equipment costs for field visits and data collection: \$19,000.

2.2. Preliminary Data Report, USD: 12,000

- Baseline report of collected data. Fees for compilation and printing: USD \$12,000.

2.3. Preliminary Analysis Report and Maps of collated data: USD \$40,000

- Report identifying and analyzing data gaps and needs. Compilation and printing fees, 100 copies: USD 15,000.
- Compilation and printing of high definition maps: USD 25,000.

2.4. Phase II Plan Report: USD 12,000

- Plan of action and strategy for a national hydrogeological survey. Consultations, compilation and printing: USD 12,000.

2.5. Report Translations: USD 15,000

- Translation of preliminary reports and Phase II Plan. Cost of unit: USD 30 x page x 500 pages = USD 15,000

3. Training

3.1. Gap Analysis Workshop (20 participants, 2 days, Erbil): USD 35,000

- DSA at USD 142 x 2 days x 20 participants = USD 5,680
- Venue at USD 2,500 x 2 days = USD 5,000
- Transportation USD 750 x 20 participants = 15,000
- Interpreting and Translation Services at USD 1200 x 2 days = USD 2,400
- Air-tickets for UNESCO Staff USD 1,000 x 2: USD 2,000
- Air-ticket for RTI expert USD 920
- Conference kit USD 100 x 20 participants: USD 2,000
- Miscellaneous = USD 2,000

3.2. Hydrogeological survey planning and strategy workshop (20 participants, 2 days, Baghdad): USD 40,000

- DSA at USD 142 x 2 days x 20 participants = USD 5,680
- DSA at USD 142 x 2 days x 2 RTI experts = USD 568
- Venue at USD 3,00 x 2 days = USD 6,000
- Transportation USD 800 x 20 participants = 16,000
- Interpreting and Translation Services at USD 1500 x 2 days = USD 3,000
- Air-tickets for UNESCO Staff USD 1,000 x 2: USD 2,000
- Air-ticket for RTI expert USD 1200 x 2 experts: USD 2,400
- Conference kit USD 100 x 20 participants: USD 2,000
- Miscellaneous = USD 2,352

3.3. UNESCO-IHE Data Training Course (20 Participants, 3 weeks, Delft, Netherlands): USD 150,000

- Tuition Fee and travel costs per unit: USD \$7,500 x 20 participants = \$150,000

4. Equipment

4.1. Database servers and data management software: USD 50,000

- High capacity server (7.5 terabytes) with RTI data management software USD 25,000 x 2 units (KRG and Baghdad) = USD 50,000

4.2. Office Equipment: USD 2,500

- Materials and hardware needed for project implementation and management: USD 2,500

5. Travel

5.1. Missions and field visits by UNESCO staff and consultants: USD 15,000

- ATK and ground transportation USD = \$15,000

6. Other direct costs

6.1. Miscellaneous (3%) – Telecom, courier, vehicle and any other needed utilities and contingency: \$8,073

6.2 Security cost (2%): USD 12,313

- Project manager missions costs: \$10,000
- Consultant security and insurance: \$2,313

7. Agency Management Support Costs: USD 38,981

Annex A: Agency Project Status Profile

Each participating organization must complete a Profile of all its ongoing ITF-funded projects/programmes within the Sector in Iraq.

UNESCO has no ongoing ITF-funded projects within the WATSAN SOT.