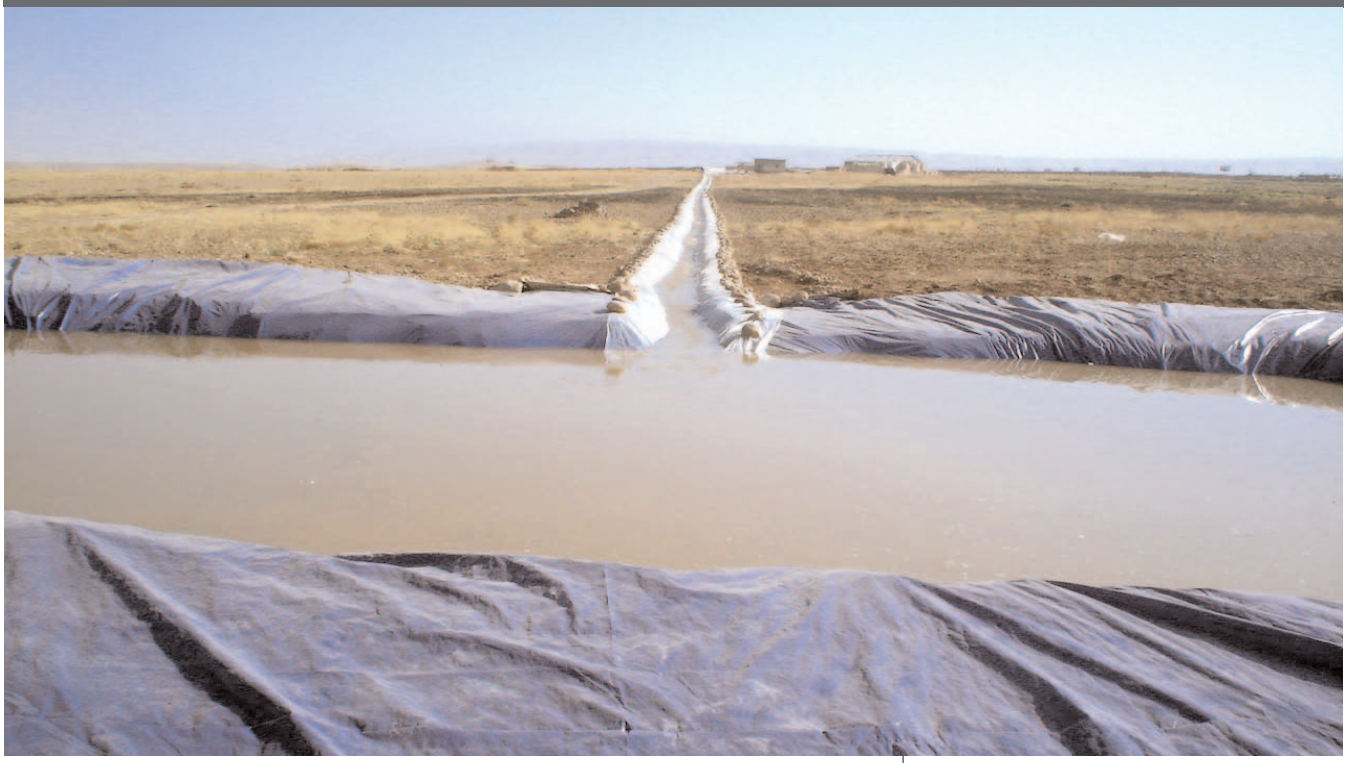
3.7 STRATEGY FOR WATER AND LAND RESOURCES IN IRAQ



A temporary water reservoir created for a field trial and using a distant water supply.

INTRODUCTION

There is a pressing need for a new, comprehensive master plan for management of Iraq's water and land resources. Many of the current guidelines for water use are based on a plan that was developed between 1972 and 1982 by Iraq's Ministry of Irrigation, working with Soviet advisors. The plan, which was developed through data collection, mathematical modeling, and evaluation of various scenarios, covered water, salt, and soil management, agriculture and irrigation, fisheries, water supply, hydropower, flood control, erosion control, and navigation. This plan proposed action over a twenty-year period, which ended in 2000.

Iraq's newly-formed Ministry of Water Resources (MoWR) recognized the need for a new effort to create an updated integrated master plan for developing and managing Iraq's water resources. In early June of 2005, ARDI brought together several of the relevant ministries to discuss the formulation of an updated master plan for water and land resources management.

The participating ministries agreed that there was a need to create a mechanism for coordination on matters of water resources planning. At the time, each government ministry or institution managed its own water use with limited consideration for the needs of other stakeholders. There was little knowledge of, or capacity to accurately determine, the actual amount of water available to Iraq, nor the capability to allocate the water between sectors in a rational manner.

Governorates with water projects.

During the initial meeting, the parties agreed to collaborate to develop a Strategy for Water and Land Resources in Iraq (SWLRI), a precursor to the development of a new master plan. They further agreed to establish a SWLRI Steering Committee under the chairmanship of the Minister of Water Resources, with key representatives from all ministries with an interest in the appropriate management of Iraq's water and land resources.

Once agreement was reached with all relevant ministries to cooperate in the development of the SWLRI, ARDI helped create a Planning Approach (Fig. 1) which has three stages: collection of necessary data, evolution of the strategy plan (including model development), and strategy reporting.

There was consensus that the development of the SWLRI would occur in two phases. Phase 1, a collaboration between ARDI and the participating Ministries with extensive oversight from the MoWR and SWLRI Steering Committee, would focus on collecting relevant data from all ministries and creating a framework for management and development of Iraq's water and land resources over the next few decades. Phase 1 activities would be carried out over a 14-month timeframe and consist of data collection under Stage A (see Fig. 1) and the initiation of activities under Stage B. Phase 1 includes:

- Data collection across all ministries to compile data sets of current information, needs in the water sector, and future opportunities (project and program development);
- Development of models and tools to inform the planning process, with a schedule to demonstrate the planning process through a run of all the models;
- Training and capacity building within the Government to ensure that staff have the necessary capability to proceed with implementation of the SWLRI in Phase 2.

Phase 2 of the SWLRI project will be led by the MoWR and will involve selection of appropriate interventions and identification of priorities in the water and land sectors using the data sets, tools, and models developed during Phase 1. This phase will also initiate the development of a "rolling" master plan that can be updated periodically upon receipt of new data and/or policy changes.

To facilitate its leadership role in the development of the SWLRI, the MoWR established a special SWLRI unit with dedicated staffing resources, including two senior chief engineers, an expert agronomist, two irrigation engineers, and two IT engineers. ARDI provided funds for the establishment of the unit, including equipment for the offices and some of the initial staff positions. The SWLRI unit took the lead coordinating efforts, both within MoWR and between ministries within the Steering Committee.

In addition ARDI subcontracted to Mott MacDoland (MM) and US Army Corps of Engineers, Hydrologic Engineering Center (HEC) to assist in the effort, based on their previous work in Iraq and their knowledge of the water resources in the region. The following sections of this chapter provide a summary of the outputs and accomplishments of the SWLRI team.

DATA COLLECTION

The first step in the development of SWLRI was to create a mechanism by which the relevant ministries could share water sector data. Because each ministry managed its own water use and needs data, other ministries did not necessarily know what kinds of information were available in other sectors. The SWLRI Steering Committee met on a monthly basis to review the data collection process.

To facilitate data collection and coordination, ARDI funded the creation of a Claromentis database, a web-based data management system that was designed to give each ministry a secure, customizable intranet in which to upload and manage its own data. One of the major challenges in the SWLRI effort was transparency of the data. Many ministries, particularly the MoWR, were resistant to the idea of giving full access to all water-related data. The Claromentis system solved this problem by storing all the information on a single server, with only the MoWR as the lead ministry and ARDI consultants able to access all the data.

The Planning Approach (see Figure 1) gave the outline of data collection needs. ARDI consultants worked with the Steering Committee to clarify what types of data were needed from each ministry. There are five types of information that needed to be compiled to provide the basis for strategic planning for water and land resources:

1. Inventories that list and map the locations of physical infrastructure (dams, boreholes, canals, drains, weather stations, pumping stations, etc.) and monitoring points. The inventories reflect the number and status of facilities in Iraq as they are now, and in some cases as they were in the past.
2. Time series records of river, canal, and drain flows; water quality; population details agricultural production statistics, etc. These should be regularly updated at a frequency to suit each type of data.
3. Aerial features of the natural environment and anthropogenic activities (soil type, forestry, land classification, population distribution, cropping patterns, urban areas, seasonal flooding, salinization, etc.). When linked to remote sensing and to GIS, aerial information can be presented in many ways that contribute to the overall planning process.
4. Planning framework: details of national goals as expressed in government policies and legislation that provide the context for strategic planning for the water and agriculture sectors. This includes the policies and plans for other sectors (energy, health, trade, etc.) that are linked directly or indirectly to the water and agriculture sectors. The water sector cannot be considered in isolation, and up-to-date information on the activities in other sectors will be needed.
5. External pressures, including economic status and relations, migration, international relations, climate change, international commodity prices, etc.

With the planning approach in place and data collection needs outlined (Information, Needs, and Opportunities), the process of data collection began. The Steering Committee appointed Data Collection Leaders (DCL) from each ministry to facilitate the data collection process. These DCLs worked with other

SWLRI STEERING COMMITTEE

Ministry of Water Resources

- Ministry of Agriculture
- Ministry of Electricity
- Ministry of Transportation
- Ministry of Environment
- Ministry of Municipalities and Public Works
- Ministry of Agriculture and Irrigation in Erbil*
- Ministry of Agriculture and Irrigation in Sulaymaniyah*
- Ministry of Planning and Development Cooperation
- Ministry of Trade
- Ministry of Industry
- Baghdad Municipality

* Now the Ministry of Agriculture and Ministry of Irrigation of the Kurdish Regional Government.

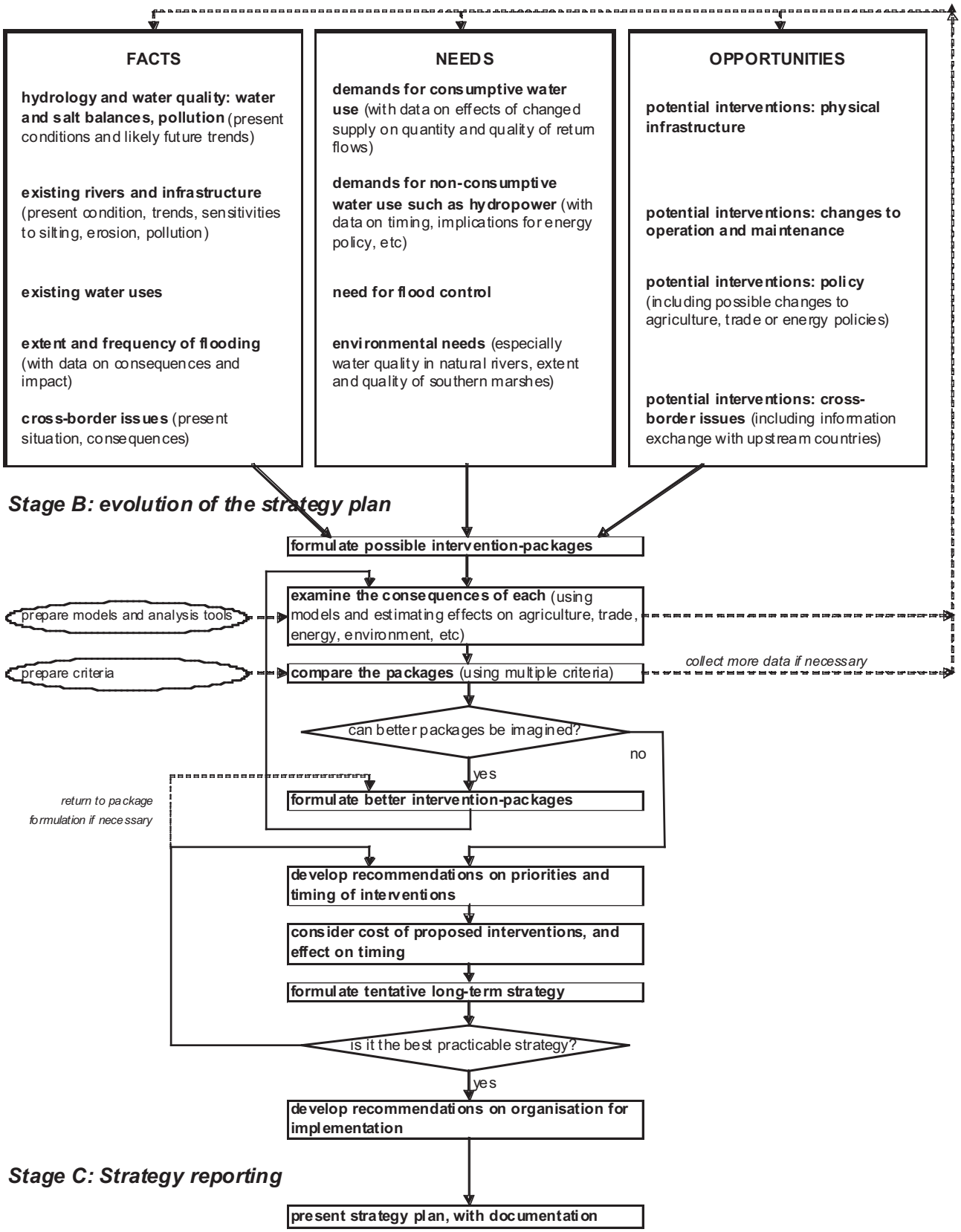


Figure 1 - Planning Approach for SWLRI

government and Iraqi consultant staff to collect the required data. This data collection process was a 14-month effort, and ARDI provided constant support to the DCLs and the Steering Committee to clarify data collection needs and prepare data for use in the development of models and other analytical tools.

These activities included:

- Scanning hard copy data sheets, reports, drawings, maps, etc, in order to build up an electronic archive of available information in the selected Claromentis data base system;
- Transferring numerical information from hard copy data sheets to digital format (spreadsheet is the most common format, but optical character reader (OCR), database, delimited text files, HEC-DSSVue were also used);
- Translating where necessary to allow key information to be shared between all parties;
- Identifying gaps, tracing missing information; and
- Reviewing data for quality control.

There was a significant lack of good historical data and a lack of information on future programs. The historical data were reviewed and corrected, based on additional data collection, additional sources, or analysis of trends to determine more reasonable values. Some of the historical data have been destroyed and cannot be recovered. The information on future plans was difficult to get, mostly due to resistance within various ministries to making their plans known to other government ministries and outside entities. This issue was partially resolved and information was more forthcoming as ministries began to see the importance of carrying out a comprehensive master planning effort for the rational utilization of water and land resources in Iraq.

Data were also collected from other sources within the ARDI project, most notably the Agro-Ecological Zone program and the Agro-Meteorological Network program, both of which are working to improve collection and use of data relevant to agricultural production (see Section 3.1). Data collected under these projects, including weather, crop water requirements, and agricultural land use were entered as part of the SWLRI data collection effort.

The inflow data feeding the water management system model also received attention under SWLRI. This work carried out by HEC included reviewing data collected through Claromentis, coordinating with the MoWR on quality control, and updating of hydrologic data records developed earlier under the IMRP. In addition, HEC improved modeling datasets reflecting the 1930- (“natural”), 2004- (“present”), and 2030- (“future”) conditions of impairment based on updated information regarding water resources projects and associated utilization and planned development upstream of Iraq. For the convenience of the MoWR, these analyses were performed in spreadsheet tools that estimate historical impairment and generate datasets for years 1930 through 2004 for the Mosul, Bakrman, Bekhme, Dokan, Adhaim, and Derbendi-khan reservoir locations. The spreadsheet-generated flow datasets were imported to, and stored in, the HEC-DSS (Data Storage System) database for the Tigris River Basin.

Figure 2 - Claromentis database web-based interface for SWLRI data collection

During Phase 1, the data sets were completed to the extent that they cover the whole country and include all significant rivers, channels, lakes, and other storages, all major structures, and details of land and water use for agriculture, urban centers, and industry. Over 10,000 documents were collected and stored on the Claromentis server. The collection of data will never really be finished, in the sense that these data sets will periodically or continually needs to be updated for years to come, to reflect the changing information, needs and opportunities in Iraq's water and land sectors.

A PLANNERS TOOLKIT

Just as a workman's toolbox contains a variety of implements, so the SWLRI planners toolkit is made up of a number of types of tools. Within a particular type there may be several items, some for general use, some very specific. Some tools have been developed during Phase 1, others have been prepared elsewhere and have been included in the toolkit because they are highly relevant to the SWLRI objectives. The toolkit should continue to develop in the future.

The toolkit presently contains four types of tools:

- Reference material: relevant reports and papers, links to web sites, best practice examples etc.
- Software: modeling packages, custom-built models, and their associated manuals.
- SWLRI technical reports and guidance notes.
- SWLRI templates and worked examples.

The development of models has been a key part of Phase 1, and these are highlighted below.

The SWLRI technical reports and guidance notes are the start of a series of occasional publications addressing issues relevant to strategic planning for the sustainable use of water and land resources in Iraq. The distinction between the two series is on the basis of function: technical reports describe work undertaken, discuss results, and make recommendations, while guidance notes

are highly focused, often short, documents that give advice, instructions, and warnings on how to use a model or technique and to interpret the results. Generally there is a guidance note to accompany any modeling software developed for SWLRI.

The Phase 1 toolkit, installed on the Claromentis system, contains three such technical reports, which cover the development of various models of the water resources system. There are currently up to 15 guidance notes in preparation.

DEVELOPMENT OF MODELS AND TOOLS

Modeling studies of water volumes and quality form a key component of SWLRI. Iraq's highly developed system of reservoirs, barrages, and irrigation facilities offer many possibilities for managing the nation's water resources, while ongoing upstream development in Turkey, Syria, and Iran introduces significant uncertainty into any comprehensive planning analysis. Under SWLRI, ARDI developed/updated sophisticated models capable of representing the complex operations of Iraq's water management system, in response to widely varying inflow conditions and regulation priorities.

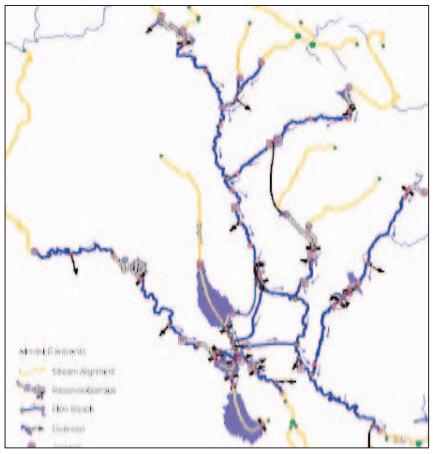


Figure 3 - Network Schematic

RESERVOIR SYSTEM SIMULATION

This effort built on the work performed for the recent USAID Iraq Marsh Restoration Project (IMRP), under which MoWR and the US Army Corps of Engineers Hydrologic Engineering Center (HEC) engineers worked together to build and calibrate a reservoir simulation model called ResSim. The Tigris-Euphrates model demonstrates a configuration of the physical layout of all projects and control points that have a bearing on the formulation of the MoWR regulation plan. Digitized stream alignments and project elements are laid over a GIS-based background map of the region, making a georeferenced schematic of the watershed. Routing reaches, which link upstream junctions to downstream junctions, complete the network connectivity of the Iraq water control system model. Figure 3 shows the schematic view of the reservoir system network for the upper system, which contains all of the nation's storage reservoirs.

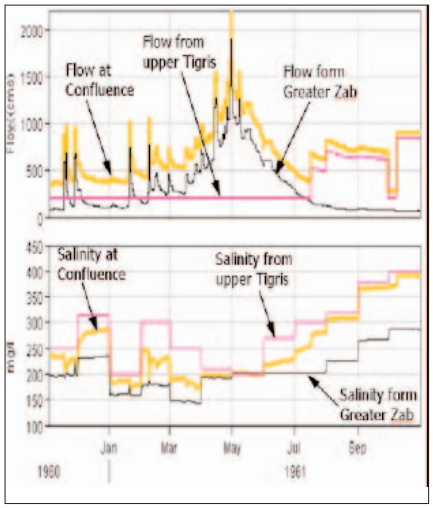


Figure 4 – Salinity Balance Simulation

The most significant enhancement to the ResSim model was the incorporation of scripted rules governing operations across reservoirs to accommodate systemwide demands. This provided extended HEC-ResSim capability for simulating water supply operation based on MoWR water management system goals. The extended capability also lends itself to answering many important questions about water management in Iraq, such as rebalancing flood control priorities in view of recently built upstream storage reservoirs, satisfying a new demand for marsh restoration, satisfying additional irrigation and water supply demands, evaluating storage reallocation strategies among the major reservoirs, or understanding the impacts of operational policies on water quality at municipal intakes or irrigation diversions. Investigations and collaboration with Mott MacDonald regarding the last topic also benefited from another enhancement to the Iraq water system management model, which handles simplified salinity accounting in the major reservoirs and throughout the Tigris and Euphrates river network.

The enhancement and expansion of the ResSim model represents a significant development for conducting difficult planning studies in the future. These state-

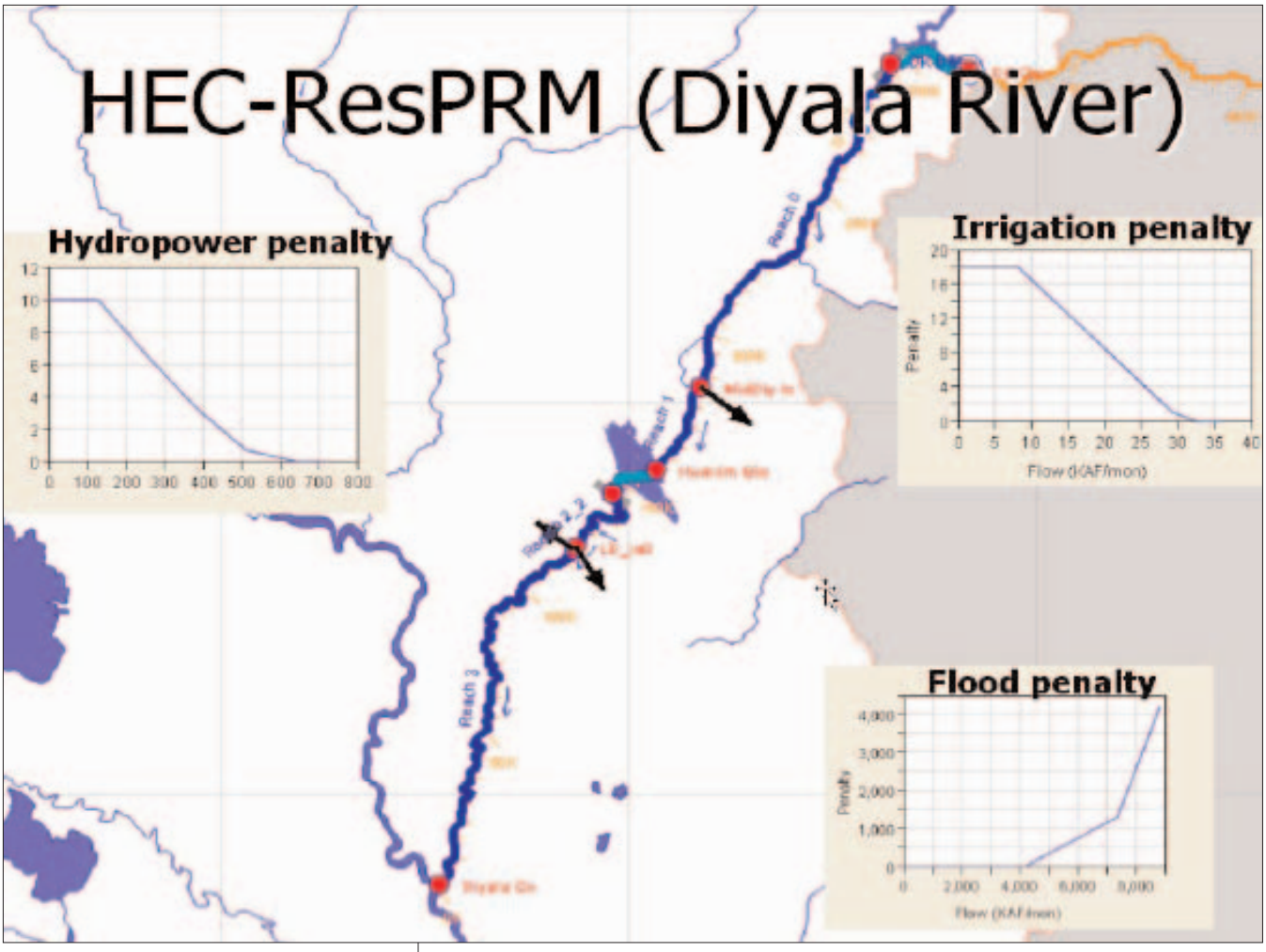


Figure 5 – HEC-ResPRM Network Schematic

of-the-art analysis tools are now available for the MoWR to perform structured and exhaustive system assessments.

PILOT SALINITY BALANCE SIMULATION

In addition to the quantity of water available for various needs in Iraq, the quality of the water plays a huge role in determining water management strategies. Salinity concerns dominate many aspects of planning for irrigation, water treatment, or environmental restoration in Iraq. SWLRI extended the ResSim model to determine salinity concentrations at each significant location, so that this water quality information is computed directly as part of the water management simulations. Using specialized software, HYDRO-1D, ARDI developed a model to compute water quality in the major reservoirs and to establish upstream boundary salinities for the ResSim Tigris-Euphrates model. A comprehensive model for the Tharthar Reservoir that simulates the salinity for selected inflows and salt load into the reservoir has recently been developed. Recent work included modeling water quality in selected channel reaches of the Tigris and Euphrates to refine parameters used in the ResSim model. Figure 4 demonstrates selected salt balance computations.

PILOT RESERVOIR SYSTEM OPTIMIZATION

At the request of MoWR engineers, SWLRI also initiated a completely new model, using the HEC Reservoir Optimization (ResPRM) modeling software for

multipurpose, multireservoir systems. This allows a different type of analysis than alternative-based simulation modeling. The ResPRM applies criteria, often economic-based, in the form of penalty functions to optimize reservoir system performance. The pilot ResPRM model focuses on the Diyala River Basin, which features two reservoirs, three major irrigation diversions, and operates for irrigation, hydropower, and flood control objectives.

The use of ResPRM (Figure 5) by the MoWR serves as an important demonstration of the link between alternatives for water usage and the economic costs and benefits, given that the economic consequences of development options are a major concern in the strategic planning process.

ARDI and the MoWR worked to create documentation and user manuals for the models, which will be useful, going forward, to train additional staff in the ministries that will ultimately be responsible for managing and running the models.

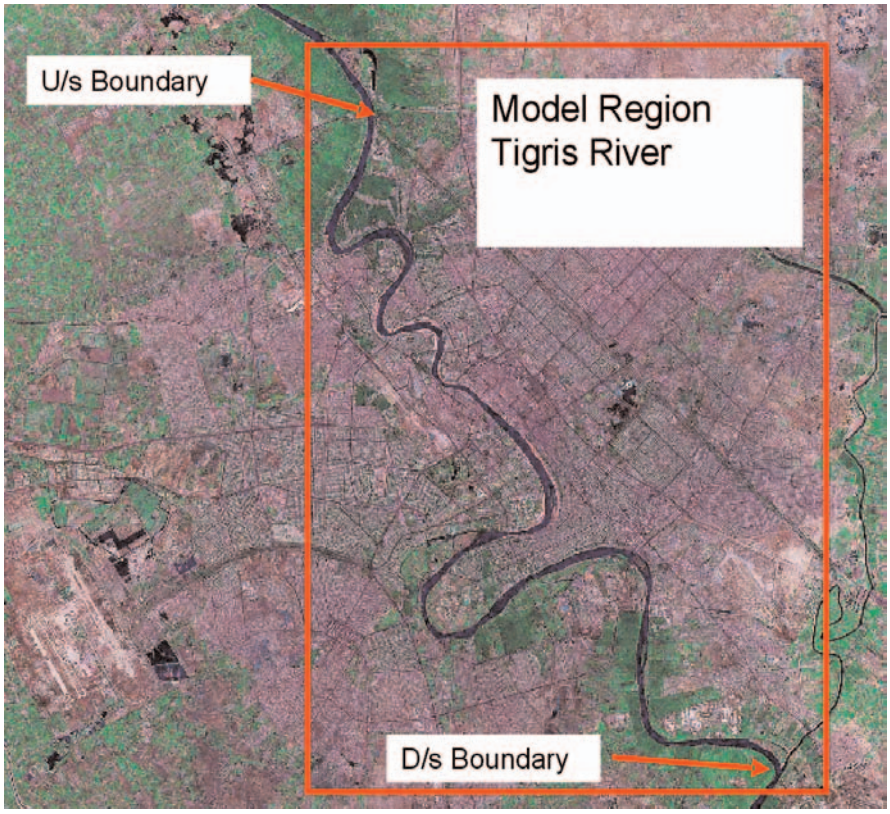


Figure 6 – Location of HYDRO-1D model reach through Baghdad

PILOT FOR LOCALIZED WATER QUALITY MODELING

Resource planners also have to deal with localized pollution problems, such as the downstream spread of pollution from large sewage works or industrial sources. The HYDRO-1D software tools mentioned above can be used to model this type of situation. Demonstrating such an application requires adequate water quality sampling data for parameters relevant to the pollution problem. To date, the model has only been tested for salinity (as part of the ResSim development), but any of the following parameters can be modeled if the data are available: biological oxygen demand, dissolved oxygen, and any

conservative or nonconservative determinant with a known degradation rate. The 1-D hydraulic model behind this can also be used to establish flood levels and current channel capacities.

MULTI-CRITERION DECISION MODEL FOR IRAQ

Multicriterion analysis (MCA) is designed to help decision makers who may be faced with several, possibly conflicting, objectives and to make the decision making processes more transparent to stakeholders.

To set up a model (a MCDM) it is necessary to define a set of criteria and to assign a relative importance weight to each one. The model also needs a value function or scoring rule for each criterion. The scoring rule describes how a score is assigned to each alternative under each criterion. The model operates on a set,or long-list of alternatives, each of which is assigned a score under each criterion. Once these elements are in place (the set of criteria, their weights and scoring rules, and the list of alternatives), the model works by computing an overall merit index value for each alternative. When the merit index values have been computed, the alternatives can, if desired, be ranked and sorted to give a priority list, with those scoring high index values at the top of the list. This prioritized list can then be used to draw up investment programs to match annual budgets or other constraints.

To be appropriate to Iraq, the MCDM needed to be developed in an iterative manner, trying out early versions with real alternatives, before it could give a good representation of the decision makers' preferences and values. The Iraq MCDM was developed with MoWR staff during the first Study Visit to Cambridge in 2006. The Guidance Note on Multicriterion Analysis was prepared with their active participation. They then went on to make a presentation to the July 2006 Steering Committee meeting which described the technique and how they had already applied it to more than 10 projects. The team had also arranged to give MCDM training to others in MoWR.

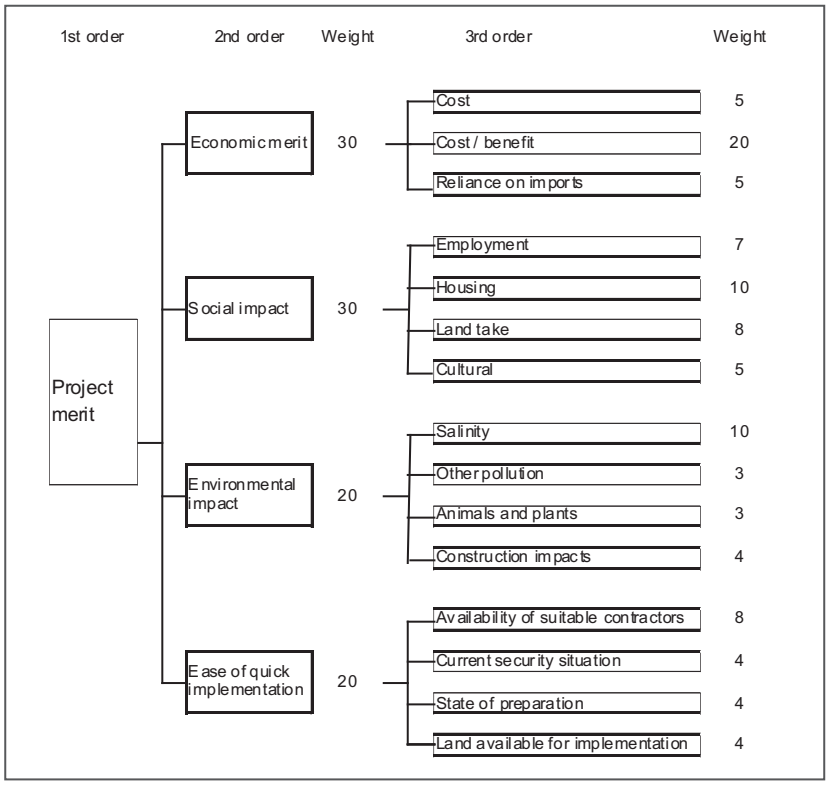


Figure 7 – Value Tree for the Iraq MCDM

OTHER TOOLS

TRAINING AND CAPACITY BUILDING

Capacity building was an essential element of the SWLRI effort, since the GOI will be taking complete control of the process during Phase 2 and onwards, using the SWLRI unit to plan the management of water and land resources in Iraq. The planning capacity of staff in the MoWR and other ministries was enhanced through their involvement in Phase 1, which was collaborative on many levels. Drafts of working papers, models, analytical tools, and other elements were circulated for discussion, both to further their preparation and to foster wide involvement in project development. This collaboration prompted considerable numbers of Iraqi professionals to become more familiar with the planning process and better equipped for future involvement in water resources management and planning. The Claromentis data management system also provided an opportunity for extensive collaboration and capacity building, as it enabled close and constant contact between ARDI and the ministry staff.

More formal training opportunities were also provided to government staff through eight in-country training courses to build capacity in specific skills. This training included GIS training, stream gauging, use of Claromentis, and hydrologic database construction.

Figure 8 - Staff from the Ministry of Water Resources receive training in stream gauging

In addition, ARDI sponsored two study tours. Four MoWR staff traveled to Cambridge, England to work with ARDI staff in home offices there for six weeks. The assignment included data sorting, development of Multicriterion Decision Analysis (MCA), and training in model development. Also, two senior MoWR staff undertook a one-week study visit that focused on transboundary water management, looking at practical experience from other river basins. Of particular interest, this visit offered insights into the implications of the European






Water Framework Directive that might come to apply to the Tigris-Euphrates basin, if Turkey continues on a path towards eventual membership of the EU.

These collaborations enhanced MoWR staff capabilities to assist in planning future water and land uses in Iraq.

GIS TRAINING

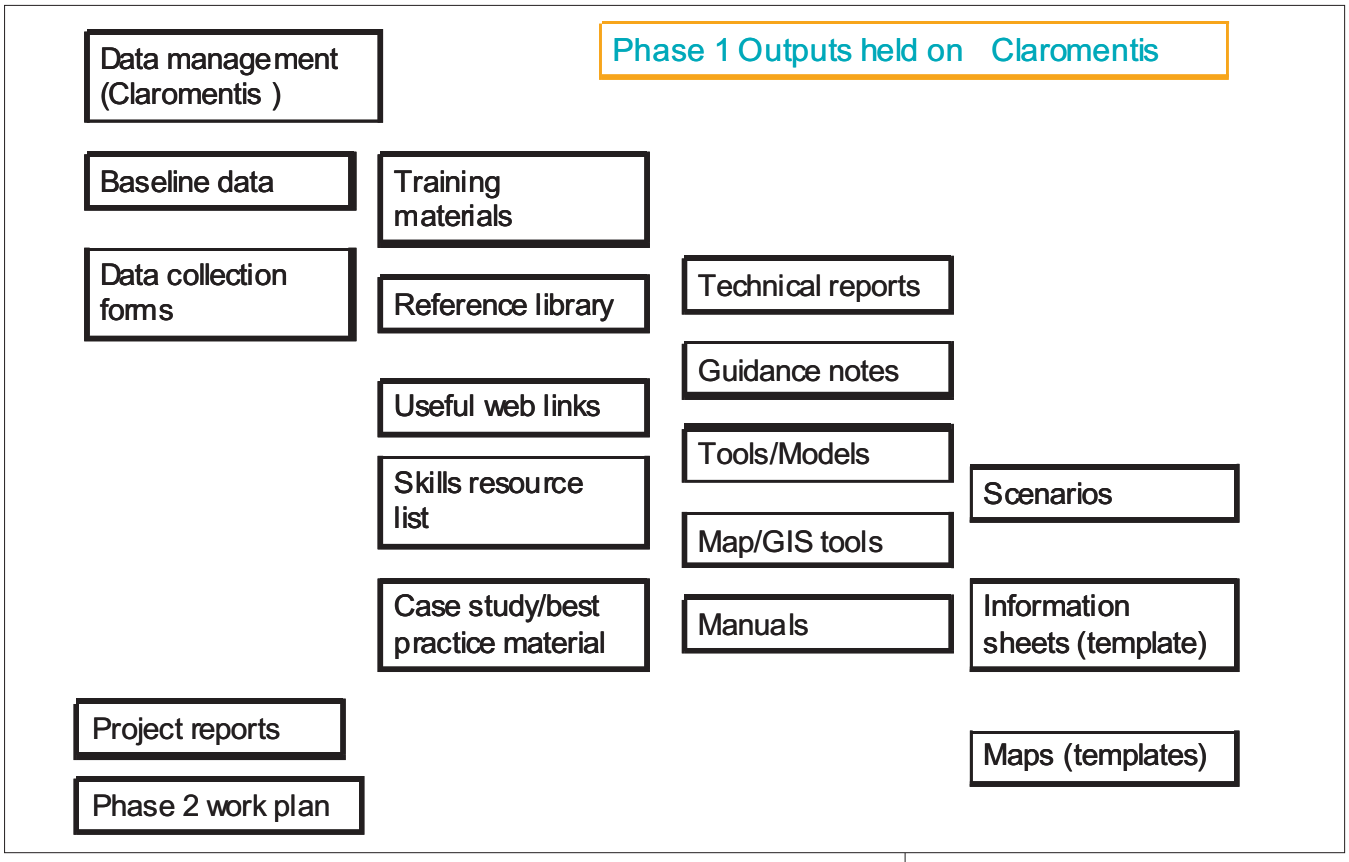
The use of spatial data, GIS, and mapping tools is very important in strategic planning and in the development of the SWLRI. The ministries will also actively use these tools in future master planning efforts, as well as in the important task of promoting the resulting plans and policies to others, including politicians, other ministries, and the general public. Many of the ministries have software and hardware for GIS, but have few or no trained staff. The goal of the ARDI training workshop was to teach basic GIS and remote sensing concepts and skills, and to train the participants in the use of ArcMap software. Some of the participating ministries already collect and use spatial data in different ways for varying functions. ArcMap is a comprehensive suite of applications that is used by many governments worldwide to manage spatial data. ArcMap will enable the ministries to coordinate data collection in the future and ensure that spatial data are collected in a structured, predefined manner.

A total of 32 staff members from ten ministries involved in the SWLRI were trained in GIS and GIS applications.

STREAM GAUGING AND HYDROLOGIC DATABASE CONSTRUCTION

The ability to measure stream flows and discharge rates of rivers and canals is essential for proper water management, and these data are important elements to inform the SWLRI and future master planning efforts. In 2005, the USAID-funded Iraqi Marshlands Restoration Program established a stream gauging station at a site in Sulaymaniyah. ARDI upgraded this station to include satellite telemetry, which enables the MoWR to have real-time access to the data collected at the station. ARDI also established an additional stream gauging station at the Tigris River in Faysh Khabour, and provided training for MoWR engineers in stream flow and discharge measurement in April 2006. The course, which was led by a five-person team of engineers and scientists from the US Geological Survey and the US Army Corps of Engineers, included training in the setup and operation of automated hydrologic monitoring equipment, telemetry devices, and acoustic Doppler current profilers (ADCPs). Members of the Italian-supported New Eden project, which provided the equipment for Faysh Khabour, joined the training so that the participants could learn to operate and maintain river gauging stations that the Italian government is supplying in southern Iraq.

The application of both fixed and mobile acoustic technology for measuring discharge proved to be of great interest. Students gained practical experience regarding the installation and configuration of modern data collection platforms, including pressure transducers for observing stage, and satellite telemetry modules. They also received training for the electronic retrieval and storage of the data. The database will be used to archive and manage the large quantities of electronic data that will be acquired as the MoWR's hydrologic monitoring network begins to take shape over the next few years.



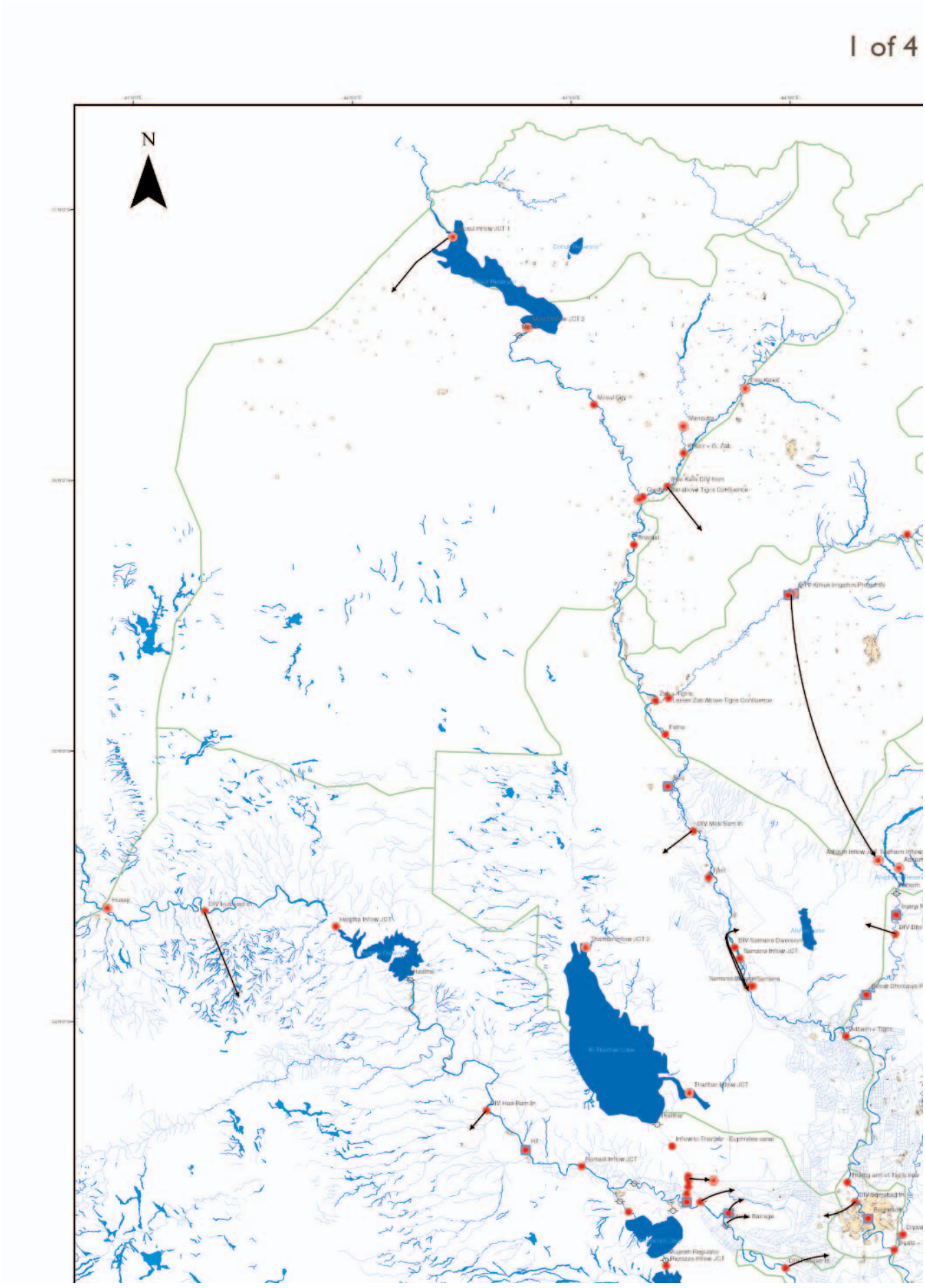
The MoWR is acquiring additional instruments that will be used to reestablish stage-discharge rating curves for many critical rivers and canals in Iraq. These ratings, combined with real-time data from the automated stream gauging stations, are needed to compute stream flows at these sites. The data will be useful in making decisions about storage and distribution of water for irrigation, industrial and domestic water use, flood control, and maintenance of water quality.

A total of 26 engineers from the MoWR were trained in stream gauging and hydrologic database construction.

(opposite, from top to bottom) Existing stream gauges will be replaced by newer technologies such as the "river boat" shown in the last photo. Other technologies utilizing telemetry for satellite transmission of data will also be incorporated into the new measurement system.

CLAROMENTIS TRAINING

A total of 49 staff from the ministries making up the SWLRI Steering Committee were trained in the use of, and administration of, the Claromentis repository and database management system. General training included system access, uses of document control, email, document uploading, and management and organization of documents. Administrator training was also provided to select staff from MoWR to administer the overall system and maintain levels of document security in accordance to established ministry policy.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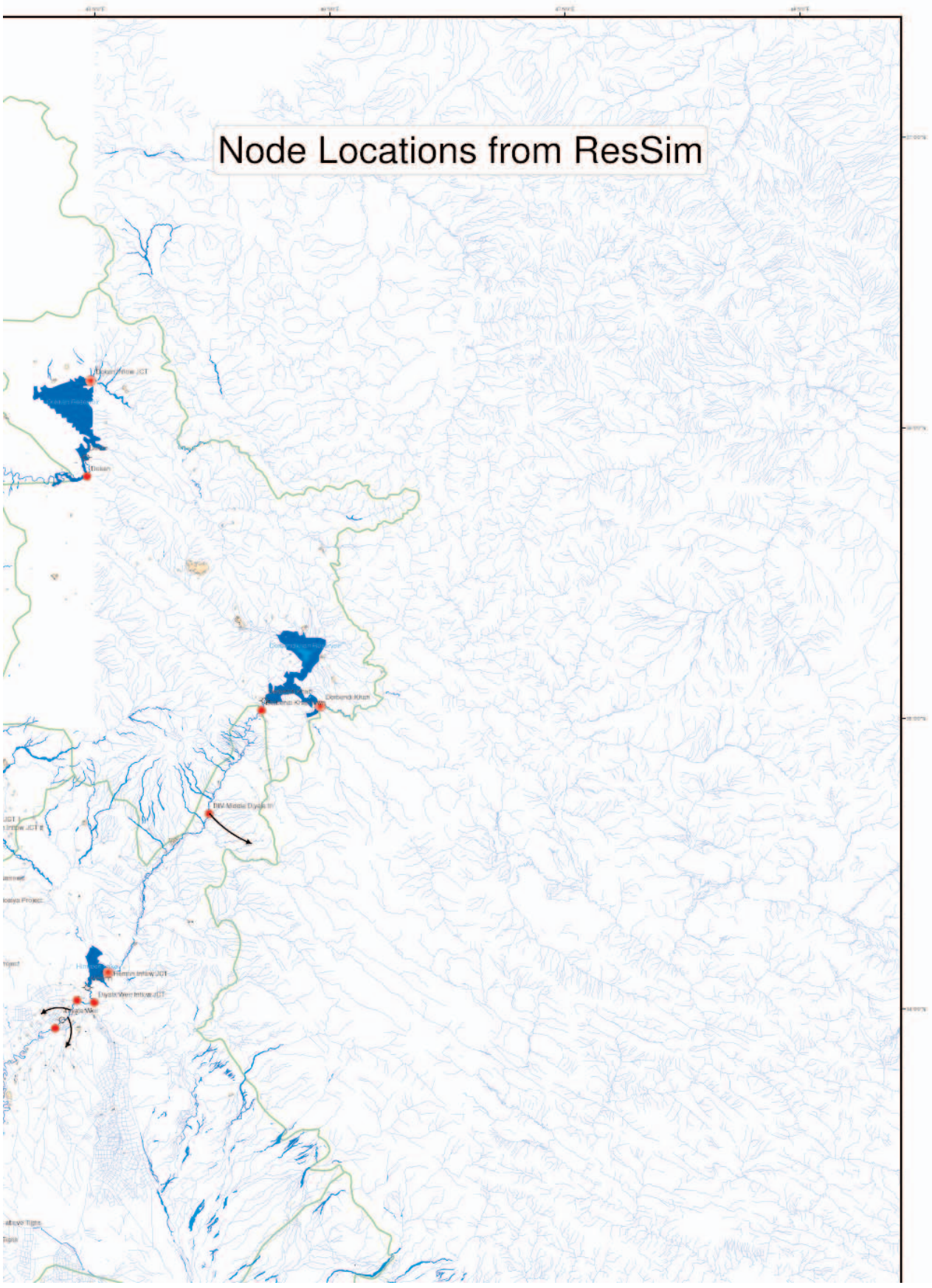

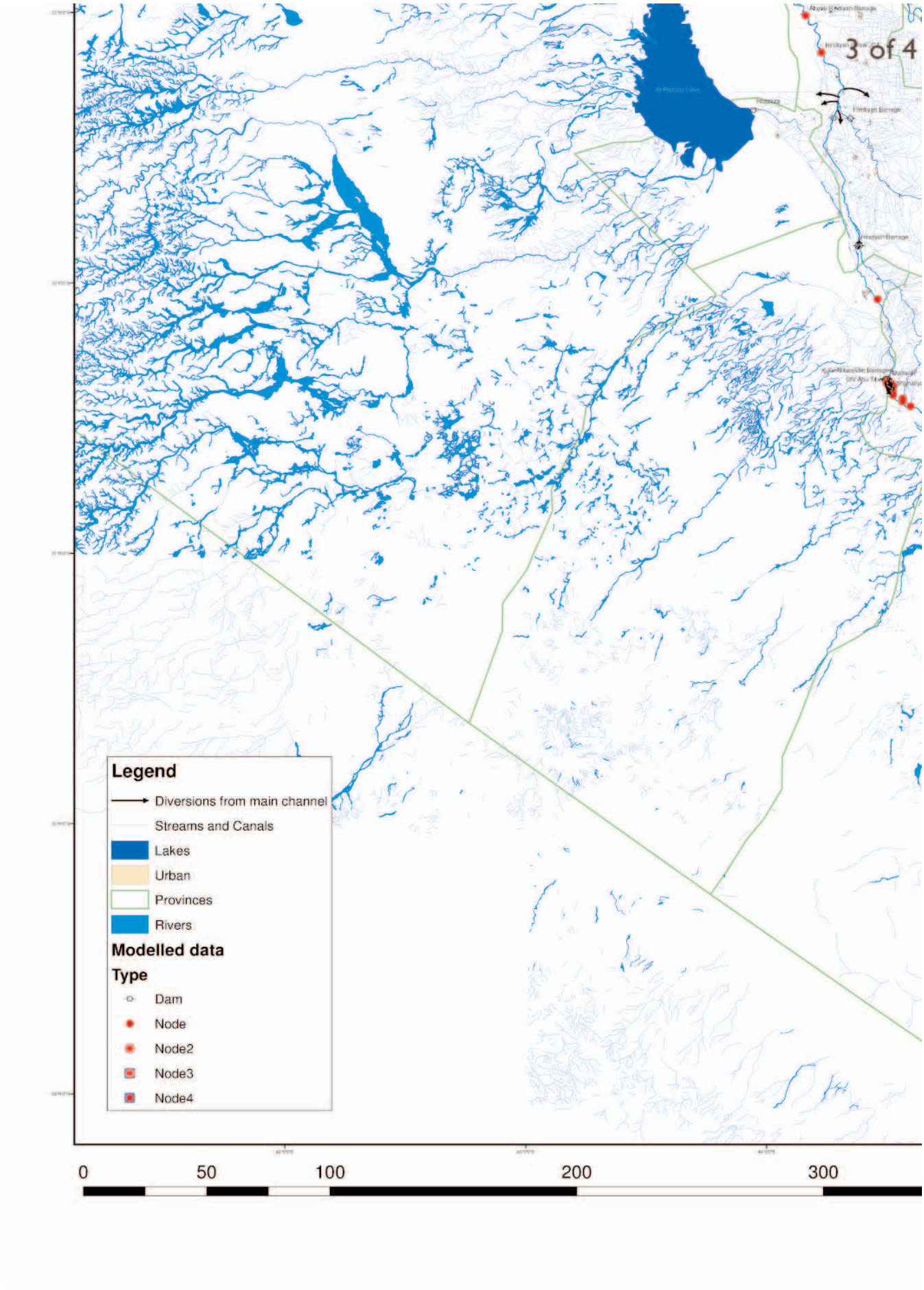
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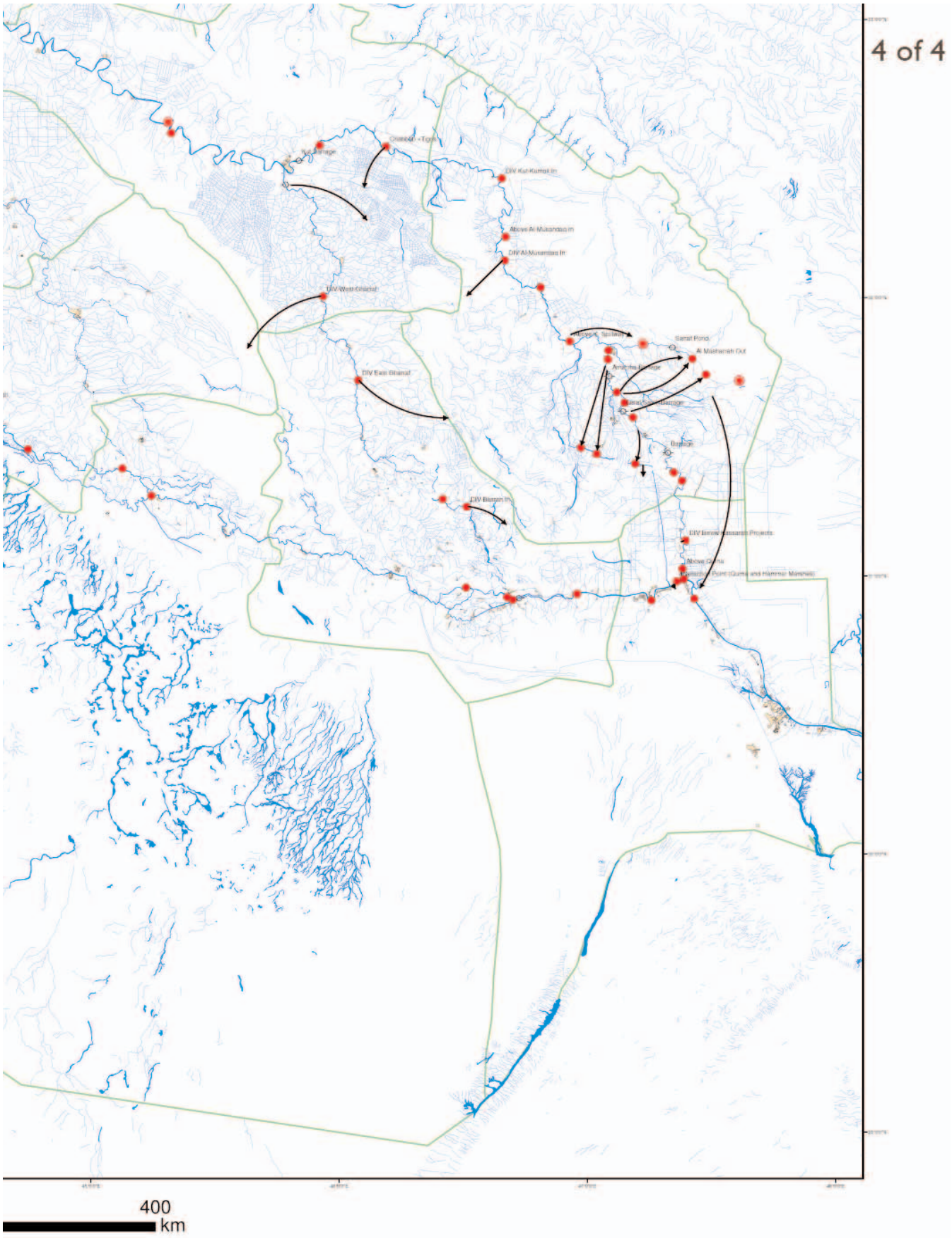
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PHASE 2 SCOPE OF WORK

ARDI, the Steering Committee, and the SWLRI Unit held a preliminary workshop (Part of the July SWLRI Steering Committee Meeting) on the nature and scope of Phase 2 in July 2006. ARDI consultants have taken these ideas and drafted a Phase 2 Scope of Work document. The document has been prepared as a proposal that the MoWR could modify, if necessary, and take forward into discussions with potential donors.

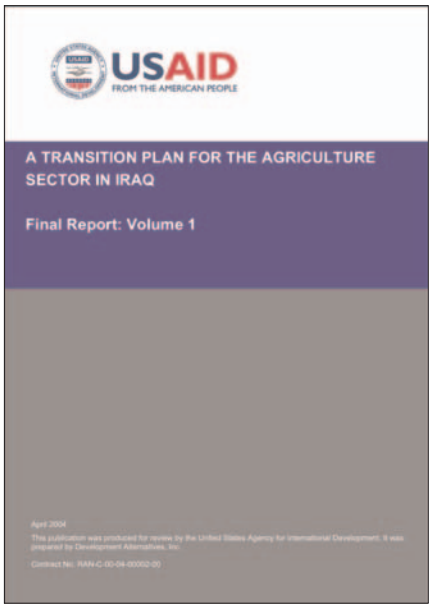
The proposal includes further strengthening of the fundamental building blocks for a successful strategy development process: data issues, modeling enhancements, more capacity building, greater collaboration between ministries, and the inclusion of other stakeholders. A government review of legal and institutional arrangements has also been identified as an essential precursor to achieving a fully fledged planning organization for the water sector.

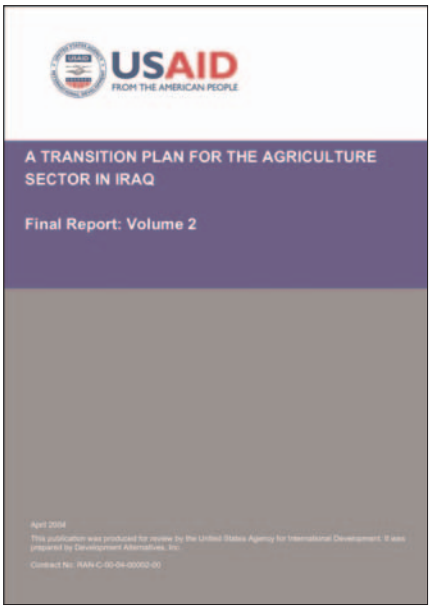
SUMMARY OF PHASE 1 OUTPUTS

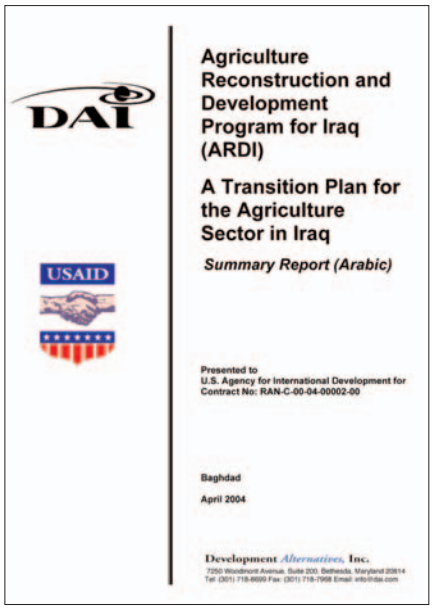
In addition to the contents of the SWLRI toolkit referred to above, training and study visit reports, a data management report, the Inception and Interim project reports, minutes of Steering Committee meetings, GIS Cluster meetings, and data collection meetings were all prepared as Phase 1 activities..

The Claromentis system hardware and software have been handed over to MoWR. This includes the data repository and the toolkit, together with the project reports, minutes, presentations, etc. associated with project meetings.

3.8 A TRANSITION PLAN FOR IRAQ'S AGRICULTURAL SECTOR







The agricultural and agribusiness sectors are Iraq's principal source of employment and their contribution to national income is second only to that of the oil industry. While Iraq has the natural and human resources, management capacity, and market opportunities to develop a modern and competitive agricultural sector, that can satisfy most of its food needs and export high-value products to the Middle East and beyond, the sector is marked by woefully low productivity and diminishing employment and income opportunities for the rural population.

The problems date from the 1960s, when the Iraqi government first formulated policies that affected the agricultural sector. National development policies generally neglected agriculture, relative to other sectors of the economy. In addition, their centrally planned approach determined which major crops would be grown, subsidized agricultural inputs, set official prices for what was produced, and established government-owned or controlled industries for processing products and distributing inputs.

Overall, such government controls have stifled private initiative. This problem has been most serious in the irrigated areas, which account for 70% of Iraq's total cultivated land and an even higher percentage of its total agricultural production. Decades of poor management and lack of irrigation and drainage canal maintenance have brought about a dilapidated infrastructure. Today, an estimated 50% of Iraq's irrigated land is either saline or waterlogged.

The *Transition Plan* included the entire agricultural sector in Iraq.

The state of the sector became considerably worse during the sanctions that followed the 1991 Gulf War. Initially, Iraq's food production rose in response to the complete ban on imports. However, production soon declined sharply because Iraq was also unable to purchase agricultural inputs and spare parts on world markets. At the same time, Iraqis' purchasing power dropped dramatically, resulting in a low effective demand for all products, including food crops.

In early 1997, the universal distribution of free food under the United Nations' Oil for Food program caused whatever was left of the domestic market to nearly disappear. This was compounded by the 2003 war, which destroyed key agricultural facilities (irrigation infrastructure, silos and warehouses, agroprocessing plants, and research and extension services) and severely disrupted input supplies to farmers.

Today, agricultural production remains at very low levels and rural poverty is widespread. In much of the country, 60 to 80% of the rural population is reported to be fully dependent on the Public Distribution System (PDS) to meet basic needs. In some areas it is closer to 100 percent.

ACTIVITIES

This transition plan was written in early 2004, a few months after the ARDI project began working in Iraq. It was prepared by USAID's contractor for ARDI, Development Alternatives, Inc., with inputs from Iraq's Ministry of Agriculture and the Coalition Provisional Authority.

At the time the plan was written, Iraq's agriculture sector was under the responsibility of the Coalition Provisional Authority. ARDI's plan was based on an assumption that responsibility for the Ministry of Agriculture would move from the Coalition Provisional Authority to the Minister of Agriculture. ARDI had two main goals:

- The goal for the immediate future (2004) was to help restore the conditions to move agricultural production to at least prewar levels, and create more jobs in the agriculture sector.
- The goal for the medium term (the next three to five years) was to move the sector from a command-and-control production and marketing system to one that is market-driven.

Wars, embargoes, and looting effectively reduced the information base in 15 of the country's 18 governorates to remembrances and estimates. In addition to the absence of hard data, the country's unsettled circumstances (and the consequent inability to move around freely) required that the transition plan be general. It was not a strategy that specified a programmed course of action; rather, it set out basic principles and recommendations for a revitalized and commercialized private agricultural sector.

Several sources of information informed this plan, including interviews and meetings with the staff of various government ministries (e.g., Agriculture at the national and governorate levels, Planning, Health), government publications, and documents from such sources as the World Bank and FAO. ARDI staff also facilitated roundtable discussions in Erbil, Sulaymaniyah, Baghdad, and Babylon governorates for private sector businessmen and women and farmers to discuss their ideas on the future of agriculture in Iraq.

THE COMPLETED TRANSITION PLAN HAD TWO PARTS:

Short-Term Stabilization Plan. This plan made recommendations for restoring agricultural production to at least where it was before the war and creating jobs in the short term (one year). This required the continued rehabilitation and reequipping of damaged and deteriorated infrastructure and facilities, and the immediate supply of critically needed inputs to farmers. The plan's elements, as stated at the time were:

- **Providing agricultural input supplies.** To get the sector moving immediately, fertilizer, good-quality seeds, proper pesticides, and other inputs (e.g., electricity and diesel for machinery) must be procured and provided to farmers.
- **Reestablishing the domestic market for wheat.** The Ministry of Trade and the private sector should begin an orderly transition to a wheat market characterized largely by market-based private sector participation, which will lead to farmers receiving international prices for wheat.
- **Reclaiming the natural resource base.** To halt the degradation of the resource base, drainage systems should be rehabilitated immediately and short-term improvements made to on-farm irrigation. The Ministry of Agriculture (MOA) should focus on rehabilitating on-farm canals and strengthening extension services.
- **Rehabilitating and reequipping MOA facilities.** Priority should be given to reconstructing veterinary clinics in the 15 southern governorates and repairing and reequipping research and extension facilities.
- **Establishing floor prices for maize and cotton.** To avoid sharp declines in the production of these two strategic crops, the government should establish floor prices that are below international prices but high enough to give farmers an incentive to produce.

Medium-Term Transition Plan. The plan made recommendations for the medium term (3-5 years, beginning in 2004) once the reconstruction effort was been launched. Then, the sector's main public and private sector participants were to effect a transition from a state-controlled, noncompetitive and declining agriculture sector to one that is market-oriented, economically efficient, productive, and employment generating:

- **Creating the appropriate policy environment.** To move agriculture forward, the government must cede control of production decisions and focus on regulation, supervision, and certification of private sector activities. A transition period is necessary in which some import subsidies must be phased out, while natural resources are protected (through, for example, government provision of animal vaccines). Export restrictions on major crops and animals must also be resolved.

  Reform of the Public Distribution System (PDS) for food is needed by eliminating the market disincentives associated with the current limited and price-controlled domestic purchases of food (especially wheat flour)

and by gradually reducing the scope of the PDS plan to make it needs-based.

- **Enabling public sector capacity to support a market-based agricultural economy.** The rules of engagement between the private and public sectors should be reconstructed to ensure that production, marketing and processing are safe for humans and the environment, and that farmers' rights are protected. This includes developing and implementing regulations, training government officials, and developing their capacity in policy and economic analysis. Technical and marketing knowledge should be made widely available through the Ministry of Agriculture.

- **Programs for the development of the sector.** The MoA needs to establish the capability to coordinate donor activities, so donors work and contribute to a common agenda. Other recommendations include:

  – Inject working capital to jumpstart the agricultural economy.

  – Test programs in wheat and sheep production and date palm restoration in two governorates and expand the successful ones nationally.

  – Develop pilot projects for the reclamation of saline soils and water resources to direct efforts to tertiary and on-farm irrigation improvements within improved land systems.

  – Work to understand how to initiate necessary changes in the land tenure system.

  – Protect vulnerable groups (displaced families, the very poor, subsistence farmers) by reaching rural communities to provide needed assistance.

RESULTS

This plan laid the groundwork and guidance for making the transition from government control to an agriculture sector based on markets and led by private initiative. Because ARDI was the US Government's only agricultural project in Iraq, this guidance also informed all of its subsequent activities. Over the next two and a half years, ARDI made important progress in realizing the goals of the short-term stabilization plan.