The Jordan Valley Authority Cost/Tariff Model

Operation and Maintenance Costs

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FORWARD

Collaborative Approaches for Resolving Water Issues

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CHAPTER ONE

INTRODUCTION

Background

The Jordan Valley Authority (JVA) is entering a period of transition now that its initial mission to support the settlement and development of the Jordan Valley has been substantially accomplished. Significant land area is under irrigation, and a viable social infrastructure of roads, schools, and clinics has been developed. In recent years, other changes have presented JVA with new opportunities and challenges. The increasing need to reallocate water from rural to urban uses has limited irrigation possibilities and increased the demand for additional water supplies. Brackish water supplies and the use of poorer-quality wastewater return flows have affected farm production, and non-irrigation activities, such as the development of a tourism infrastructure, have risen in importance to the Kingdom. Cost-of-service recovery, funding, and commercialization issues have become increasingly prominent concerns as well. Maintaining and improving service levels, and introducing institutional changes to carry them out, have intensified JVA's need for flexible and sophisticated analytical and policy tools for utility and financial planning. They will permit the Authority to respond better to future needs of the country.

Goals and Objectives of the Cost/Tariff Model

The goal of developing the JVA cost/tariff model is to improve the Authority's short- and long-term financial planning and budgeting through the provision of powerful, but user-friendly, analytical and policy tools.

Objectives of this effort were to:

- assess the cost of delivering water to the Jordan Valley under both present and more efficient conditions;
- assess the viability of alternative management measures to improve efficiency; and
- use costs as a basis for assisting JVA in restructuring tariffs for farmers in ways that are sensitive to a number of factors, including variations of seasonal flows and water quality.

The model was not intended to be a monthly cash flow accounting model or an engineering systems operations model, although it can be put to a variety of planning and evaluation uses.

USAID's FORWARD Project

In 1996, the United States Agency for International Development (USAID) initiated the Fostering the Resolution of Water Resources Disputes Project (FORWARD). It was designed

to combine technical and mediation/facilitation expertise in order to address critical water resource issues more effectively.

Many times, strictly technical efforts fail to address underlying issues that impede agreement or buy-in from the parties involved. A key aspect of the FORWARD approach is to work closely with stakeholder interests to foster on-going participation and agreement so that conflicts can be avoided and implementation realized.

FORWARD's efforts in Jordan commenced in late 1996 when the government identified the cost/tariff issue as a key, but difficult, policy matter in the water sector. This led to a design mission in April 1997 to develop a financial planning cost/tariff model for JVA, contracting in August 1997, and completion of the FORWARD efforts on the JVA model in fall 1998.

CHAPTER TWO

COLLABORATIVE PLANNING PROCESS

Collaborative Planning Process and Agreements

In April 1997, FORWARD developed the Analytical and Policy Tools for Costing and Tariffs workplan with MWI and JVA staff. The cost/tariff model is the main tool for the costing and tariff program. The nature of the model and its use and design were agreed to by the senior MWI and JVA staff.

In August 1997, MWI, JVA, and FORWARD met to initiate the JVA program. The meeting was an opportunity to identify the technical issues and agree on the process details of collaborative planning throughout the course of the program. In that meeting coordination levels and channels were identified as follows:

- Technical staff in Amman and the Jordan Valley to build consensus on basic data of costing and revenues;

- Technical Working Group (TWG) from JVA to follow on the project progress, participate in the data interpretation and analysis, and provide advice to resolve technical issues; and

- Policy and decision makers to agree on policy issues related to evaluating multiple tariff and efficiency scenarios such as the overall cost recovery, the willingness and ability of customers to pay, who should pay for public interest expenses, and determine the applicability of efficiency criteria and its relevancy to JVA operations.

Coordination at the three levels was carried out on a continuous basis throughout the modeling effort. Monthly meetings were carried out with the Technical Working Group to review the program progress and plan activities.

Major issues and agreements within the process included:

- Collection and billing;

- Allocation of costs among directorates and cost centers;

- Model design to reflect the cost of water transfer at the Deir Alla intake to Amman; and

- Model design sensitive to different prices for different water qualities and seasonal variations.

Collection and Billing

JVA has an automated billing system that tracks water sales to JVA customers and farmers. However, collection of billing is not tracked on a seasonal or annual basis. It only shows the

cumulative outstanding debts for farmers. By law, JVA could cut water supplies to farmers who do not pay the debts and could also sue them. JVA staff suggested that FORWARD include only the billing data in the model. FORWARD discussed the issue with JVA and explained that collection of billing is an efficiency measure and could reflect on the financial performance of the Authority. JVA and FORWARD agreed to include percentages for the collected bills in the model. Hence, evaluation of the utility performance and financial scenarios could be pursued more realistically.

Allocation of Costs among Directorates and Cost Centers

In August, JVA and FORWARD agreed to develop discrete cost centers at the primary system, secondary system, King Abdullah Canal (KAC), and pumping station levels. The FORWARD team tried to collect the costing information for the above-mentioned cost centers, but JVA does not keep the cost records as requested. FORWARD worked with JVA staff to allocate the costs from JVA's operation and maintenance (O&M) budget into water and non-water activities. Then costs were allocated to different directorates and system levels. Assumptions were utilized in the cost allocation process. The model was designed on that basis. It was also agreed that once JVA would have the Financial Accounting System (FAS) functioning, real figures would replace the assumptions in the model.

Model Design to Reflect the Cost of Water Transfer at the Deir Alla Intake to Amman

The Water Authority of Jordan (WAJ) receives water supplies from the Jordan Valley. The King Abdullah Canal carries the water from different sources including the Yarmouk River, the Wadi Arab Dam and the North Conveyor into the Jordan Valley. Part of the KAC water is being pumped to Amman for municipal use.

In August, JVA, WAJ and MWI agreed that the JVA model should address the issue of the Deir Alla transfer to Amman. It was also agreed that the model should have a separate sheet for Deir Alla.

The minister, JVA, and FORWARD agreed on the costing methodology and the direct cost items in the sheet. Another cost item category named "lost opportunity cost" was also included in the Deir Alla sheet.

Model Design Sensitive to Different Prices for Different Water Qualities and Seasonal Variations

The irrigation water policy recognizes that the water pricing function should include a water quality component. On that basis, MWI and JVA requested FORWARD to design a cost/tariff model sensitive to water qualities in different irrigation zones and stage offices. In agreement with MWI and JVA, the irrigation water cost/tariff model divides the valley into four water qualitiy zones. The zones are based on the water quality of irrigation sources and their relevant parameters. The water quality zones are Yarmouk water quality or similar quality in KAC north, mixed KAC and King Talal Reservoir (KTR) water quality, KTR water quality, and relatively brackish water quality from Karamah Dam.

CHAPTER THREE

MODEL OVERVIEW

Uses of the Model

The cost/tariff model gives JVA the capability to:

- examine and forecast the demand for irrigation and non-irrigation water service;
- compare customer demands against available system capacity;
- allow for rationing or full provision of service;
- calculate the annual cost of service at various cost centers in the system;
- aggregate those costs in various useful ways;
- specify different types and levels of utility tariffs and fees;
- model different levels of revenue recovery; and
- explore planning and policy parameters for what-if type analyses on the utility's operations and finances.

Structure of the Jordan Valley Authority

Cost-based models must take into account the organization of the entity since budgeting and monitoring are typically structured along these lines. The supply and delivery systems at various discrete points also need to be considered since they affect the cost of service. This information is useful for cost center analyses and tariff setting.

Institutional Organization

The Jordan Valley Authority is organized into directorates performing either a specialty service or providing water service delivery to a geographic area within the Jordan Valley. Although JVA provides water and non-water services to the valley, FORWARD focused on the water-related activities directly associated with providing water service, including water-related costs for:

- the geographic areas of the North, Central, South and Southern Ghors providing delivery service to farms;
- the Central Operation and Maintenance Directorate — providing O&M to the King Abdullah Canal, certain other primary supply facilities, and pump stations;

- the Dams Directorate — providing planning and O&M for large dams and reservoirs; and

- the Workshop Directorate — providing centralized workshop maintenance and repair services.

Non-water costs and the costs of JVA management in Amman were excluded from the model. They were allocated to national costs to reflect the Authority's overall mission of integrated development in the Jordan Valley.

Water System

For purposes of cost-center evaluation, possible tariff setting, and commercialization assessment, the JVA water supply system was subdivided into four major components:

- primary supply system, including dams, major conveyors into the KAC, and diversion weirs;

- King Abdullah Canal primary conveyance system;

- pumping stations off the canal; and

- the secondary delivery system, which delivers irrigation water from KAC or from major sources to the farm units.

The primary supply system was further delineated into individual major sources of supply. Data for KAC were developed to determine costs at various key points along the canal. The pumping stations and secondary delivery systems were separately identified to determine possible wholesale costs of supplying water to those points under commercialization planning scenarios.

For purposes of irrigation demand forecasting, supply allocations decisions, and possible tariff setting, JVA water demands were subdivided into ten stage offices and the Southern Ghor Directorate. For further water demand and tariff-setting analyses, varying irrigation application rates were specified for the four different geographic climatic zones within JVA from north to south. Four major water quality classification were also identified for evaluation of effects on farm production and consideration of specialty tariffs:

- Quality 1 —higher quality water
- Quality 2 — mixed fresh KAC, and KTR waters
- Quality 3 — KTR only
- Quality 4 — mixed fresh KAC, KTR, and Karamah waters

Schematic drawings of the Jordan Valley irrigation system are shown in Figures 1 through 3 illustrating the components and demand centers.

FIGURE 1
SCHEMATIC OF JORDAN VALLEY DEMAND AND SUPPLY CENTERS

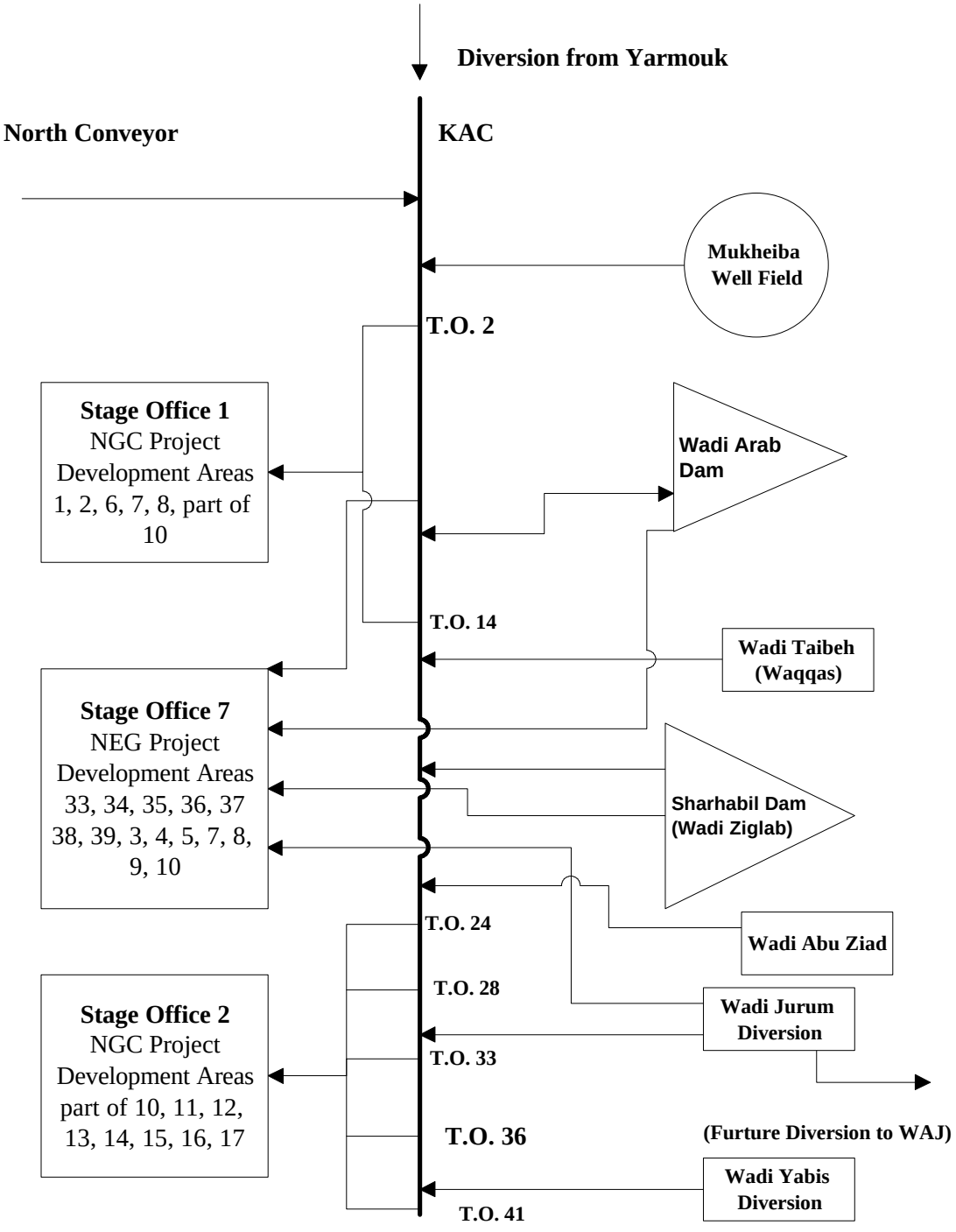


FIGURE 2
SCHEMATIC OF JORDAN VALLEY DEMAND AND SUPPLY CENTERS

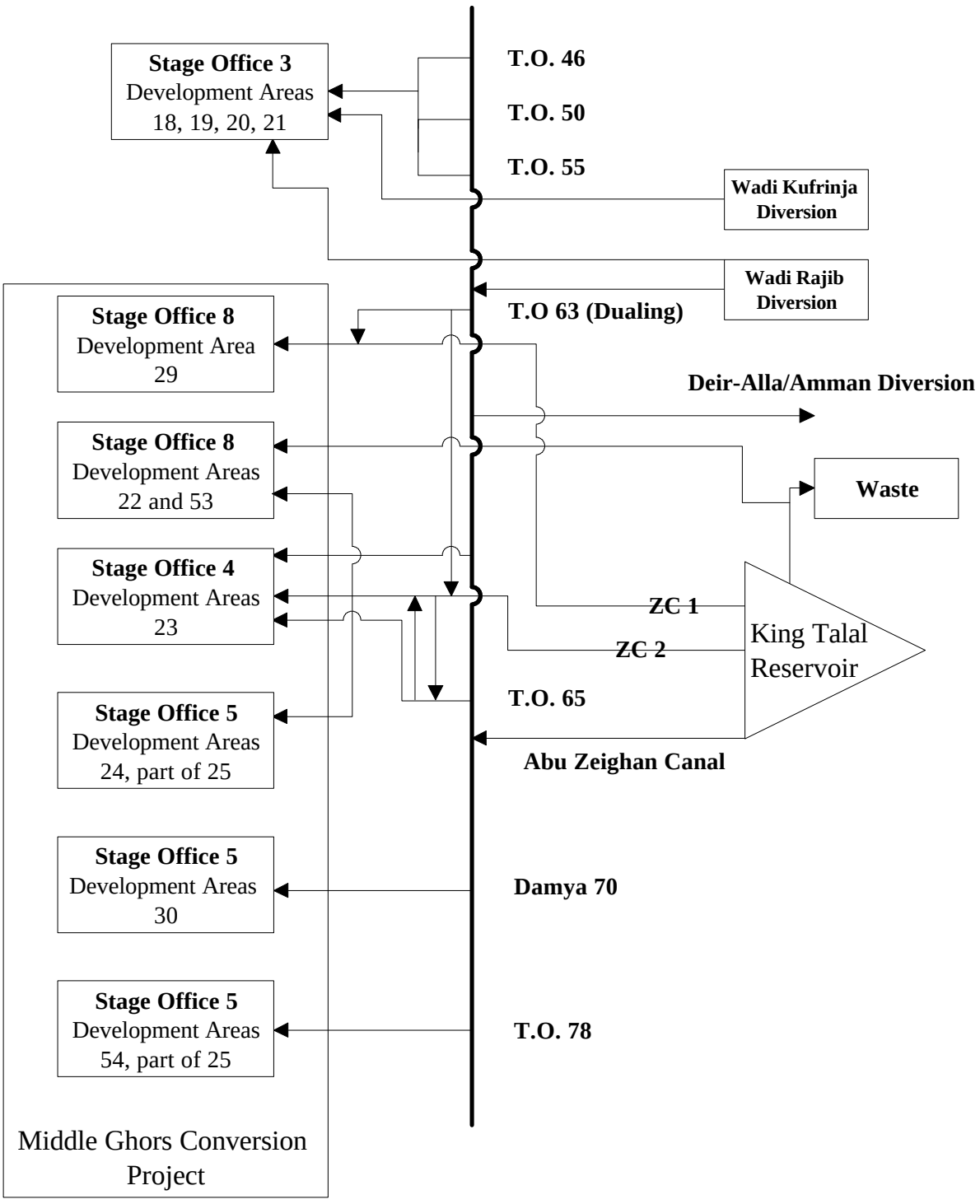
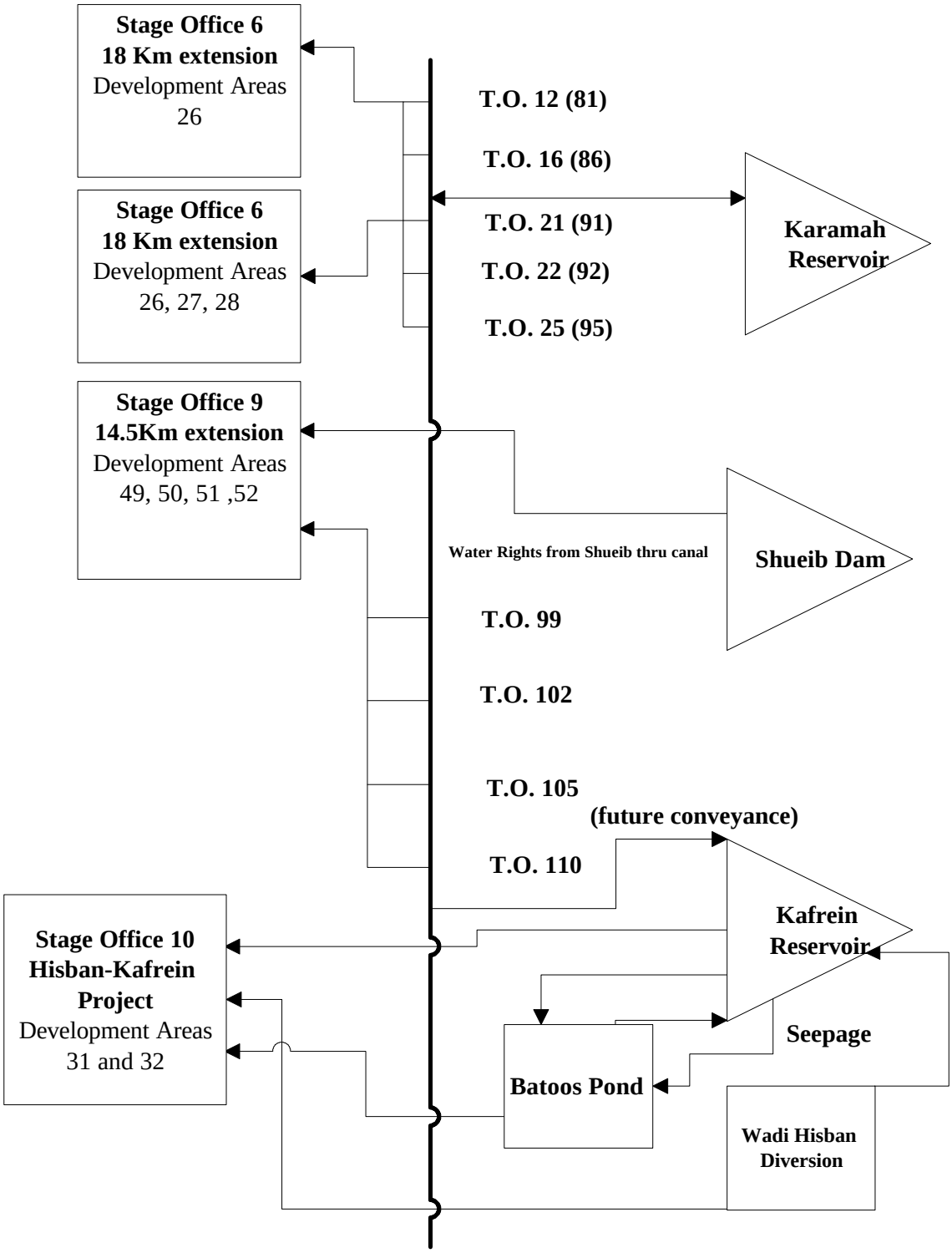


FIGURE 3
SCHEMATIC OF JORDAN VALLEY DEMAND AND SUPPLY CENTERS

SOUTH DIRECTORATE



Structure of the Model

The JVA model was developed using Microsoft Excel 7.0 electronic 3-D spreadsheet software to permit an easy understanding of the model's organization, calculations, and links, and to facilitate what-if analyses of different planning scenarios. The model comprises one workbook file and is subdivided into logical planning, engineering, and financial components, assigned to one or more worksheets (pages) of the workbook. Data links exist between individual components (worksheets) within the model. To the extent possible, care was taken in the model design to develop standard cost accounts and model parameters for each cost center and to structure tables, where possible, in a similar location and format. Two years of historical data are provided in the model for reference and benchmarking purposes, and the forecast timeframe is five years into the future.

Major Components

At its most simple level, the JVA model contains four major analytical components or processes that represent either a single worksheet or groups of worksheets within the model, including:

- **Financial/Model Parameters.** Summary financial information in tabular and graphical form as well as global model parameters that, when changed, can have widespread effects upon the model's calculations and results. This component also allows for the cost of service to be considered with or without a capital cost consideration.

- **Planning.** Various underlying factors and calculations affecting system growth, water demand by stage office, water supply availability, and how water supplies are allocated in either surplus or deficit conditions.

- **Revenues.** Calculations that generate system revenue by stage office, on a seasonal basis, or according to water quality. This module also considers miscellaneous fees, as well as other adjustments to revenue.

- **Costs.** Variously-defined cost centers of the utility, the local parameters that uniquely affect that cost center's expenses, the calculation of costs for that cost center, and various aggregations of cost centers used for tariff considerations.

Model Flow

While the JVA model can be simply categorized into the four major components listed above, the underlying details are somewhat more complicated with a larger number of sub-components addressing various planning, engineering or financial issues and data flowing from one table and portion of the model to another.

While input parameters affecting the calculations are present at various steps throughout the model, the model essentially begins with irrigated areas and theoretical cropping requirements to reach projected water demand. The projected demand is then compared to available water supplies at stage office level, and decisions are made on how to ration supplies during shortages or how to allocate or draw upon various supplies during surplus

conditions. These are then used, as well as other data, as key inputs to determine the expenses of variously defined cost centers.

JVA can enter data related to each cost center in the model and allocate the common expenses to cost centers through a certain percentage of allocation that can be specified by JVA management. These cost data are then aggregated at various levels of financial analysis. Expected system income is generated from usage data multiplied by the applicable tariffs (which may reflect seasonal, water quality, or usage-level features), calculated fee income, and adjusted for billing collections. This expected utility income is then compared with utility expenses, resulting in the net income of the system. Various management decisions can then be made to change variables underlying utility income or expenses to see how this affects desired performance goals.

CHAPTER FOUR

MODEL RESULTS

At the final policy/planning workshop with JVA in August 1998, various results of the FORWARD program were presented and discussed, including an assessment of current costs of the system and how costs, tariffs, and financial performance might vary under alternative future scenarios.

Current Costs

Several warnings are in order with respect to these cost estimates. The current JVA financial accounting system does not track operation and maintenance expenditures at a cost center level. Therefore, it was necessary, for the time being, to allocate higher level directorate O&M costs back to the supply sources and system. O&M costs were then converted to a unit cost basis, using the average supply capability of the source. Once a new financial accounting system is implemented, actual cost center information can replace these interim estimates. However, the overall limit cost of irrigation water in the valley was not affected by cost allocation.

Cost by Supply Sources

Table 1 reflects the estimated cost of supply for the year 1997 at various major supply sources within the Authority. While various projects, such as Wadi Arab and the North Conveyor, reflect the highest unit costs — primarily due to pumping costs, these resources also provide substantial supplies to the system.

Table 1: Estimated Operation and Maintenance Unit Costs for 1997 by JVA Major Supply Sources

Source	fils/m^3	Source	fils/m^3
Yarmuk	1	Karamah	2
N. Conveyor	18	Shuieb	2
Mukheiba	1	Kafrein	6
Wadi Arab	16	Hasa, etc.	5
KTR	4	Wadi Araba	5

Allocated Costs to JVA Directorate

Table 2 reflects the allocated current O&M for JVA. These allocated cost totals include not only the spending of the Valley directorate itself, but also other costs allocated to projects within the directorate's boundary from the Central O&M, Dams, and Workshop directorates. Of the JD 5.235 million estimated annual operating cost in 1997, the North Directorate accounted for about 46% of annual JVA water-related operating costs, followed by the Middle Directorate at 26%, the South Directorate at 14%, and the Southern Ghors Directorate at 14%. The high cost in the North Directorate is attributed to the primary supply cost centers of the North Conveyor and Wadi Arab. These costs were not reallocated to the Middle and South Directorates.

Table 2: Operation and Maintenance Costs Allocated to JVA Directorates for 1997

Valley Directorate	JD (Million)
North	2.429
Middle	1.345
South	0.727
Southern Ghors	0.734
Total	5.235

Costs by System Components

Table 3 reflects the estimated current costs for JVA by system component. Of the JD 5.235 million estimated annual operating cost in 1997, supply sources accounted for about 38% of annual costs, followed by the secondary delivery system at 36%, the KAC primary conveyance at 12.5%, and pumping stations at about 13% of annual costs.

Table 3: Estimated System Component Operation and Maintenance Costs for 1997

Component	JD (Million)
Sources	2.002
KAC	0.653
Pumping	0.680
Secondary	1.899
Total	**5.235**

Costs at the Deir Alla Transfer Point to Amman

The estimated cost and possible price of JVA water supply at the Deir Alla transfer to the Water Authority of Jordan - Amman Governorate is of interest in the FORWARD analyses. In working with Ministry and JVA staff, FORWARD obtained agreement on what supply sources — primarily Wadi Arab Reservoir and the North Conveyor — should be reflected in the cost-of-service portion of this assessment. Consequently, Table 4 indicates the estimate of the

basic operating cost of service for the water transfer at Deir Alla to be JD 0.875 million in 1997 or 23 fils per cubic meter in 1997.

Table 4: Estimated Cost and Possible Price of Transfer at Deir Alla for 1997

Item	Amount
Cost of Service – O&M	
WAJ Supply Sources — Wadi Arab and KAC	0.666
WAJ allocated O&M costs in the North & Middle	0.209
Subtotal	0.875
Other Considerations	
Wadi Arab Incremental Capacity	0.189
North Conveyor Incremental Capacity	0.431
Additional KAC Operations	0.035
Kufranja Lost Revenue	0.120
Water Quality Impacts	-
Subtotal	0.775
Possible Price Basis (JD million)	1.650
Water Transfer (MCM)	38.616
Possible Unit Price (fils/m^3)	43

JVA also requested that the following considerations, beyond the direct cost of service, be included in the pricing of water:

- costs for the entire capacity of the North Conveyor and Wadi Arab Reservoir, which were constructed to address the reallocation of irrigation water to urban uses. Wadi Arab is currently used to regulate flows to the Deir Alla transfer;

- additional costs of operating the KAC to maintain water levels and water quality at the Deir Alla diversion point;

- opportunity cost of lost revenue to JVA of not being able to sell the natural flows of Wadi Kufranja for irrigation, due to WAJ wastewater effluent discharges and the need to route these flows out of the irrigation scheme to avoid contamination of supplies going to Deir Alla through KAC; and

- place holder for possible consideration of a charge to help mitigate water quality impacts to JVA farmers in the middle and southern portion of their system resulting from degraded water quality from Amman effluent discharges into the King Talal Reservoir and the lower KAC system.

These additional pricing considerations totaled JD 0.775 million in 1997, without water quality impacts considerations, or about 20 fils per cubic meter, bringing the total potential price of water (full recovering expenses) at the transfer point to Amman to 43 fils per cubic meter.

The Water Authority of Jordan does not necessarily concur with this pricing rationale, and the ultimate price will likely be subject to negotiation or high-level government decision.

Overall Unit Operating Costs

In addressing the unit operating cost of water service, three informative concepts were examined. All three representations of unit costs used the same annual costs, but differed with respect to the quantity of water used as the divisor in the equation.

The first concept relates the unit cost of supply available. Supply available is the total water quantity recorded from the sources that supply the JVA system; this water could be made available to JVA customers. Here the 1997 water-related operating expenses are divided by the water supply available in the JVA system, resulting in a unit O&M operating cost of 15 fils per cubic meter.

The second concept relates the unit operating cost of delivered water. Delivered water is the recorded/metered water delivered to the customers and includes wadi water rights. Here the 1997 water-related operating expenses are divided by the water quantity delivered from the JVA system, resulting in a unit O&M cost of 26 fils per cubic meter.

The third concept relates the unit operating cost of water billed. Water billed is the recorded or metered water charged to JVA customers. The 1997 water-related expenses are divided by the water quantity billed to JVA customers and WAJ, producing an overall unit O&M cost of 27 fils per cubic meter. The costs to Deir Alla transfer were included in the overall unit cost concept, which can be divided into WAJ unit cost at 43 fils per cubic meter and other JVA customers' unit operating cost of water billed at 23.5 fils.

To arrive at these varying measures, the major reasons that water was not sold were assessed. In some years there is supply that remains in storage and not utilized until a later year. There is also the provision of riparian water rights for which JVA may incur the cost of delivery but cannot bill for the water. Finally, there is the unaccounted-for water in the system, currently totaling about 27% of the water released into the system. This unaccounted-for water is comprised of both physical losses (primarily leaks, seepage, and evaporation) and administrative losses (no or poor metering, illegal connections, and inherent or addressable inefficiencies in systems operations). There was no reliable estimate of the relative contribution of these two factors contributing to the unaccounted-for quantities available at the time prior to the development of the model.

Current Revenues and Financial Performance

Tariff Structure, Billings, Collections, and Revenues

The current JVA irrigation tariff has been in place for several years and makes no seasonal, geographic or water quality distinctions. It is structured into four usage block charges, including:

Usage Level (m^3)	Tariff (fils/m^3)
0-1000	8
1001-2000	12
2001-3000	15
>3000	35

In 1997, about 152.552 million cubic meters of irrigation water was billed to the farmers by JVA, resulting in potential irrigation revenue of JD 3.212 million or unit revenue of 21 fils/m^3. However, collections totaled only about 67% of irrigation water billed, resulting in irrigation revenue collected of about JD 2.152 million or a collected unit revenue for irrigation of about 14 fils/m^3. Potential revenue from WAJ for the Deir Alla transfer totaled JD 1.650 million, recovering only O&M costs, or a unit revenue for municipal raw water sales of 43 fils/m^3. However, JVA does not receive any revenues from WAJ, and this amount is considered to be inter-governmental transfer.

Overall Financial Performance

JVA annual O&M cost in 1997 was JD 5.235 million. However JVA revenues from farmers in the same year was JD 2.432 million, and their potential collected water revenues from WAJ water was JD 1.65 million. The government considers WAJ payments as inter-governmental transfers. JVA incurred an estimated operating loss of JD 2.803 million, representing 46% O&M cost recovery, without collecting WAJ payments. However, when considering inter-governmental transfers, for Deir Alla water, JVA incurred a JD 1.153 million loss, representing 22% of their O&M costs.

According to JVA, uncollected bills are debts that farmers should pay at a certain stage to the Authority. The uncollected bills could be looked at as debt due to JVA that farmers have to pay.

CHAPTER FIVE

FUTURE FINANCIAL PLANNING SCENARIOS

Obviously, the current level of financial performance is not desirable or likely sustainable over the longer-term. The pressing question is what action or series of actions can address this issue effectively. In order to evaluate the relative merits of various alternative course of action, benchmarks need to be defined. For the purposes of the August 1998 workshop, the current condition and a defined "no action" future were specified as benchmarks or bases for comparison of various new action alternatives.

Scenario 1: No Action Future

JVA will take no significant new actions other than to implement projects, such as the Mujib Reservoir, that are already initiated. No action is taken to change tariffs, improve efficiencies, increase collection rates, or change other management policies. This scenario does not consider inter-governmental transfer as potential revenues from WAJ for the supply of water from Deir Alla. Under this scenario, system-operating losses grow to JD 4.097 million or 38.9% of O&M cost recovery by the year 2000.

Scenario 2: Increase Tariff Structure and Increase Performance through Improved WAJ Collections Until JVA Attains 100% O&M Recovery

We have assumed that WAJ collection is 100% for the supply of raw water at the Deir Alla transfer. Furthermore, the irrigation tariff is increased from 1998 to 2000 when JVA attains 100% of O&M cost recovery. The same percentage of increase is applied for all blocks. If this billing for WAJ (based upon the possible transfer price) is collected by JVA, but collections from farmers remain at current levels, the irrigation tariff increase in 1998 would be only a 19% increase in 1998 and a smaller increase of 4% in the years 1999 and 2000.

Scenario 3: Same Tariff Structure but Increase Performance through Improved Farmer and WAJ Collections

We have assumed 100% collection from WAJ for supply of raw water at the Deir Alla transfer, now zero collection from WAJ. JVA will improve collection from irrigation water sales to farmers to reach 90% billing collections. This would allow JVA to recover 106.4% of O&M costs in 1998. Substantial gains could be made from increasing farmer collection efficiency.

Scenario 4: Same Tariff Structure but Increase Performance through Improved Overall Collections and 20% Staff Salary Cut

We have assumed 100% collection from WAJ for supply of raw water at the Deir Alla transfer, now zero collection from WAJ. JVA will improve collection from irrigation water sales to farmers to reach 90% billing collections, and staff salaries for JVA staff would be reduced 20% through attrition or lay-off. Under this scenario, O&M cost recovery increases to 121%.

It should be noted that improved collection efficiencies appear to have much greater financial impact than policies addressing staffing levels.

Scenario 5: Increase Tariff Structure and Increase Performance through Improved Overall Collections

We have assumed 100% collection from WAJ for supply of raw water at the Deir Alla transfer, now zero collection from WAJ. JVA will improve collection from irrigation water sales to farmers to reach 90% billing collections. Also we increased tariff by 10%, the increase was done for irrigation water only, and we have applied the same percentage of increase for all blocks. Under this scenario, O&M cost recovery increases to 111.8%.

Other Scenarios

The scenarios described above are indicative of some of the capabilities of the model, although various other scenarios were modeled and presented illustrating even further analytical capabilities of the model. These included addressing revenue and impact issues with seasonal and water quality tariffs. A further forecast was made of the addition of the pending Mujib project, its provision for industrial, municipal/tourism, and irrigation uses. The revenue gain from this project's implementation and multi-purpose water sales are potentially sufficient to allow the Authority to attain cost recovery substantially in excess of O&M expenses.

CHAPTER SIX

MODEL COORDINATION, TRAINING, AND TRANSFER

Coordination with JVA and Others

The basis of FORWARD's approach to addressing issues is close coordination with the stakeholders; early agreement on approach, assumptions, and methods; and continuing coordination and agreement throughout the efforts to help assure ultimate buy-in and implementation of the study tools and recommendations.

This level of coordination and agreement was essential to the success of the JVA cost/tariff model efforts. The close working relationship began with the initial scoping efforts in April 1997 and was furthered at a multi-day workshop in August 1997 to jointly-define key issues. It continued through day-to-day communications with JVA staff and regular monthly coordination meetings with an appointed JVA Technical Working Group. Senior officials with JVA and MWI were kept appraised of the FORWARD efforts and results. These efforts culminated in two policy/planning workshops in April and August 1998 where the results of the program were reviewed and accepted.

Transfer to JVA Planning Capability

At the initiation of the FORWARD program, a request was made to JVA to identify a model operator who would be the designated person to operate and maintain the model for the Authority. A capable JVA engineer was assigned to this role and was involved in the model development and coordination during the course of the efforts. This resulted in a familiarity with the model, its components, and data sources. To further facilitate JVA capacity-building and transfer, use, and upkeep of the model, FORWARD prepared an informative users manual and conducted a two-day training workshop at the completion of the program activities attended by several JVA staff.

Further Capacity Building – JVA Financial Accounting System Effort

One of the items identified during the course of the cost/tariff model building activities was that the level of organization and system detail desired in the cost/tariff model to evaluate various policy and planning issues could not be well supported by the current financial accounting system (FAS). While the current JVA FAS can produce aggregate and directorate-level cost information, this high level of available information impeded assessment of various discrete cost centers, cost allocations, and possible commercialization initiatives.

To address this need for more detailed and accurate financial accounting data, FORWARD recently conducted a scope design mission to develop an improved financial accounting system for JVA. The design of the FAS will begin in early 1999. The cost/tariff model has been structured so as to allow this improved data to be incorporated into the model's current and forecasted cost analyses once the full effort is funded and completed.