

FINAL REPORT VOLUME VIII
SUPPORTING REPORT
FOR
PART-A “WATER RESOURCES MANAGEMENT MASTER PLAN”
Chapter 11 Visualization of Water Resources Management Master Plan

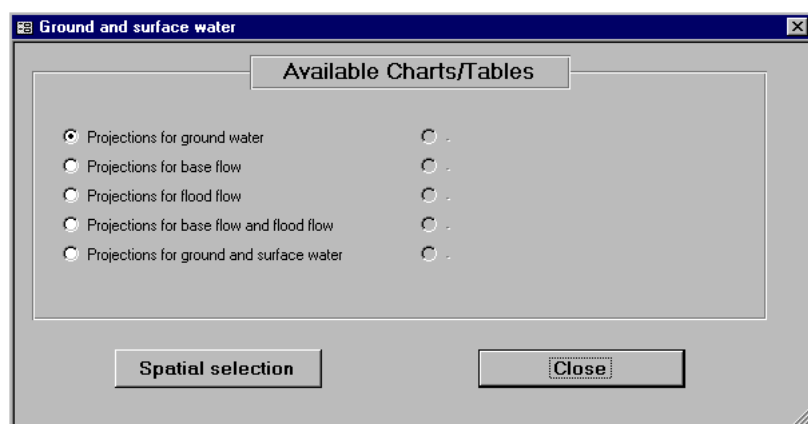
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Resources

3.5. Data Type: Ground and Surface Water



5 different chart types are available for the irrigation demands.

3.5.1 Chart Type: Projections for Groundwater

Data Type
Ground and surface water

Chart Type
Projections for groundwater

Oracle Access Rights for
JORDAN.STP_GROUNDWATER
JORDAN.SPATIAL_INTERSECT_UNITS

The projections for groundwater are the future resources estimations calculated by the sector managers by using the GW pre-processing modules. These are the results from the rainfall-runoff-infiltration model. This model is based on the USGS Curve Number method. The results for deep infiltration are stored in the Oracle WIS STP table JORDAN.STP_GROUNDWATER per GW_CELL_ID, scenario, year and month. Additionally, the quality (salinity) parameters of the resource is written to this table. The groundwater cells are equal to the groundwater basins, but the system can deal with any other groundwater balancing unit.

As the groundwater is a resource which is stored for a non-point object (polygon) it happens, that a unit of aggregation (e.g. governorate) intersects the groundwater basins. To assemble the total GW resource for one governorate, different groundwater basins have to be considered with a certain percentage. The groundwater basins are considered to be homogeneous, the resource for that part of the basin, which is located within governorate X is given by the percentage of area, which is part of governorate X. These percentages are fixed as long as the spatial data remains stable. The percentage values of all possible intersections are stored in the Oracle table JORDAN.SPATIAL_INTERSECT_UNITS. This table gets filled by the intersection tool (see documentation) and this has to be redone, if the spatial data (gw basins, nation, governorates, districts, surface water basins, service zones) has changed. **If this table is incomplete or not up to date, the results may give wrong figures!**

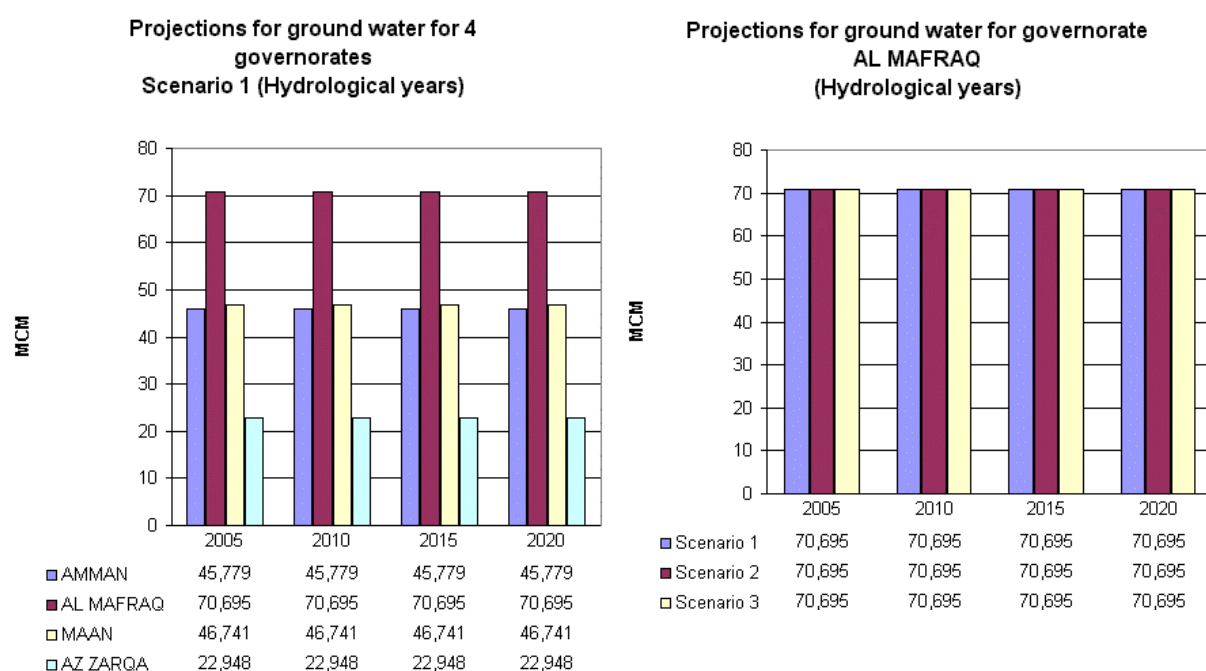
projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 scenarios 	groundwater basin	<ul style="list-style-type: none"> nation governorates surface water basins groundwater basins

The Projections for groundwater parameter dialog offers a set of parameters to choose from. In the spatial selection window you select a spatial unit for aggregation of the projected groundwater. You can draw three scenarios in one chart or the three types of year. You can distinguish between the different salinity classes by selecting the boxes. If you do so, the Excel chart will show you the water volumes for every salinity class in a separate bar.

Restrictions: You can either plot different gw basins or different scenarios or different types of year or different salinity classes in one chart. Due to restrictions in MS Excel it is not possible to chart more than one scenario or more than one type of year or more than one salinity class, if you have already selected more than one polygon in the spatial selection window. Only one of the 4 parameters [objects / scenarios(s) / type(s) of year / salinity class] is allowed to be a multiple selection.

	multiple governorates	multiple scenarios	multiple types of year	multiple salinity classes
governorates	>1	1	1	1
scenarios	1	>1	1	1
type(s) of year	1	1	>1	1
salinity class	1 class or sum	1 class or sum	1 class or sum	> 1 class

Sample results:



Projection of scenario 1 for 4 governorates

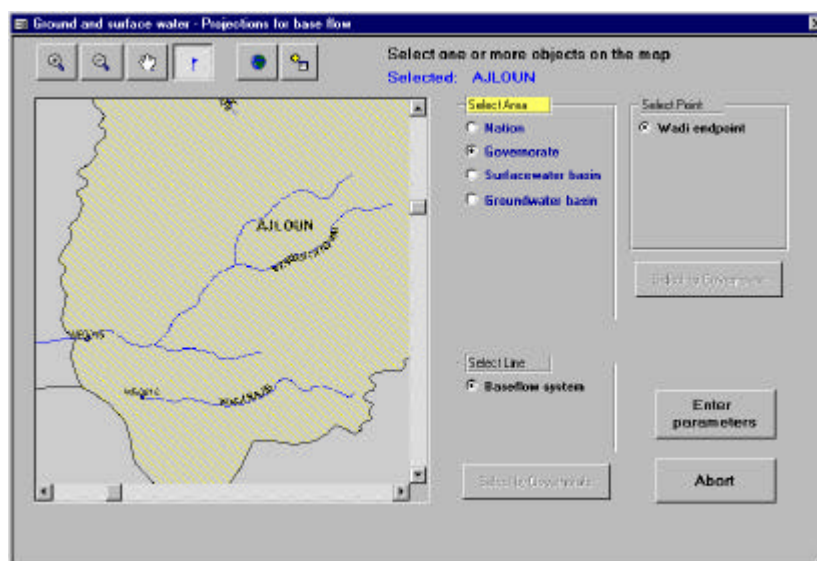
Comparison of the 3 scenarios for governorate Al Mafraq. It seems that the scenario parameters are the same for all three scenarios.

3.5.2 Chart Type: Projections for Base Flow



The projections for base flow are the future resources estimations calculated by the sector managers by using the GW pre-processing modules. Projecting base flow is in fact a post-balancing procedure, as it is part of water management. Water can be transferred along the wadis, if it was not used upstream. The values for the projected base flow which will be available as a resource along the wadis are stored in the two Oracle WIS STP tables JORDAN.STP_BASEFLOW per SEGMENT_ID, scenario, year and month. The water, which will not be used along the wadis will be available at the so-called wadi endpoints. These values are stored in the table JORDAN.STP_BASEFLOW_END per WADI_ENDPOINT_ID, scenario, year and month. Additionally, the quality (salinity) parameters of the resource is written to the two tables. The resources volumes of the wadi endpoints and the wadi segments will be summarized by the DVS before presentation.

As the base flow is a resource which is stored not only for non-point objects (lines) it happens, that a unit of aggregation (e.g. governorate) intersects the wadi segments. To assemble the total base flow resource for one governorate, only those parts of the wadi segments have to be considered, which are located within the governorate boundaries. The wadi segments are considered to be homogeneous, so the resource for that part of a segment, which is located within the governorate is given by the percentage of length, which is within the governorate. These percentages are fixed as long as the spatial data remains stable. The percentage values of all possible intersections are stored in the Oracle table JORDAN.SPATIAL_INTERSECT_UNITS. This table gets filled by the intersection tool (see documentation) automatically and this has to be redone, if the spatial data (wadi segments, nation, governorates, districts, surface water basins, service zones) has changed.



If this table is incomplete or not up to date, the results may give wrong figures!

The base flow resource cannot be projected per single base flow system (the two themes “wadi endpoints” and “base flow segments” are drawn in black text color, not in blue). It can be calculated and visualized only per area.

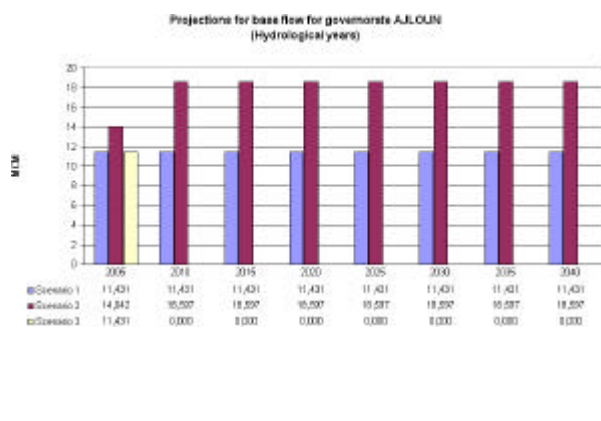
projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 scenarios 	wadi segment and wadi endpoint in database In the DVS the volumes cannot be charted for single base flow systems	<ul style="list-style-type: none"> nation governorates surface water basins groundwater basins

The Projections for base flow parameter dialog offers a set of parameters to choose from. In the spatial selection window you select a spatial unit for aggregation of the projected base flow. You can draw three scenarios in one chart and you can distinguish between the different salinity classes by selecting the boxes. If you do so, the Excel chart will show you the water volumes for every salinity class in a separate bar.

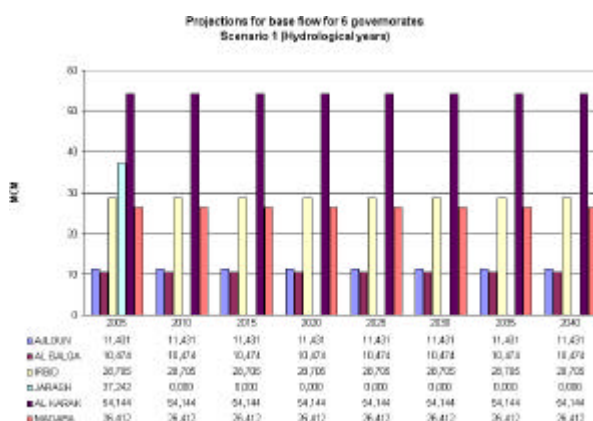
Restrictions: You can either plot different units of aggregation or different scenarios or different salinity classes in one chart. Due to restrictions in MS Excel it is not possible to chart more than one scenario or more than one salinity class, if you have already selected more than one polygon in the spatial selection window. Only one of the 3 parameters [objects / scenarios(s) / salinity class] is allowed to be a multiple selection.

	multiple polygons	multiple scenarios	multiple salinity classes
polygons	>1	1	1
scenarios	1	>1	1
salinity class	1 class or sum	1 class or sum	> 1 class

Sample results:



Projection of the 3 scenarios for governorate Ajloun. There are no values saved for scenario 3 and year > 2005.



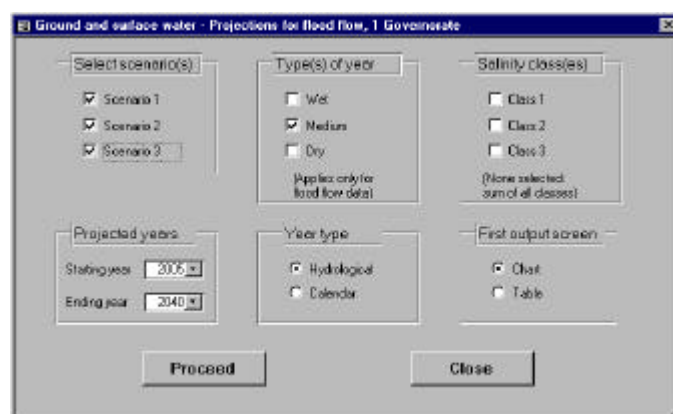
Comparison of the 6 governorates. The base flow scenarios are the same for all planning years.

3.5.3 Chart Type: Projections for Flood Flow



The projections for flood flow are the future resources estimations calculated by the sector managers by using the Runoff/Infiltration pre-processing modules. The values are the results from the rainfall-runoff-infiltration model. This model is based on the USGS Curve Number method. The results for flood flow are stored in the Oracle WIS STP table JORDAN.STP_FLOOD_FLOW_OUT per wadi endpoint, type of year, scenario, year and month. Additionally, the quality (salinity) parameters of the resource is written to this table. The type of year indicates, whether a planning year is dry, median or wet in the comparison with the hydrological history.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 types of year 3 scenarios 	<p>wadi endpoint</p> <p>In the DVS the volumes cannot be charted for single wadi endpoints</p>	<ul style="list-style-type: none"> nation governorates surface water basins groundwater basins

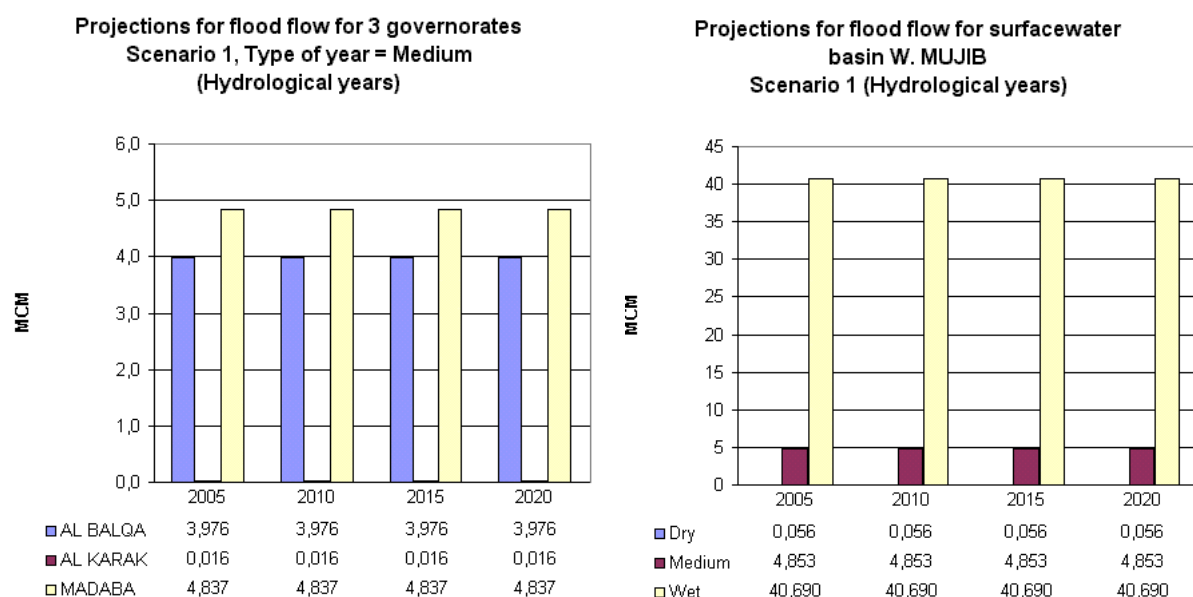


The Projections for flood flow parameter dialog offers a set of parameters to choose from. In the spatial selection window you select a spatial unit for aggregation of the projected base flow. You can draw three scenarios in one chart or the three types of year. You can distinguish between the different salinity classes by selecting the boxes. If you do so, the Excel chart will show you the water volumes for every salinity class in a separate bar.

Restrictions: You can either plot different units of aggregation or different scenarios or different types of year or different salinity classes in one chart. Due to restrictions in MS Excel it is not possible to chart more than one scenario or more than one type of year or more than one salinity class, if you have already selected more than one polygon in the spatial selection window. Only one of the 4 parameters [objects / scenarios(s) / type(s) of year / salinity class] is allowed to be a multiple selection.

	multiple polygons	multiple scenarios	multiple types of year	multiple salinity classes
polygons	>1	1	1	1
scenarios	1	>1	1	1
type(s) of year	1	1	>1	1
salinity class	1 class or sum	1 class or sum	1 class or sum	> 1 class

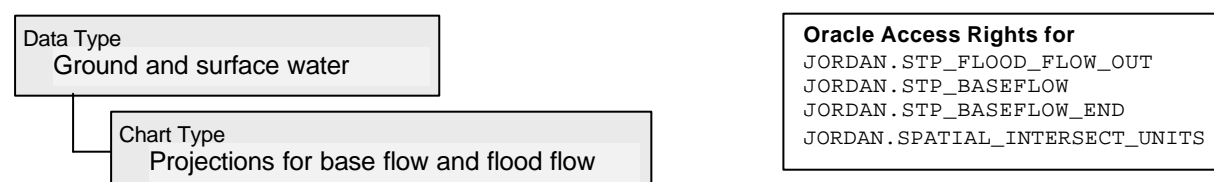
Sample results:



Projection of the 3 scenarios for governorate Ajloun. There are no values saved for scenario 3 and year > 2005.

Comparison of the three types of year (dry/median/wet) for basin Wadi Mujib. The dry year was not projected or does not give any base flow resource.

3.5.4 Chart Type: **Projections for Base Flow and Flood Flow**



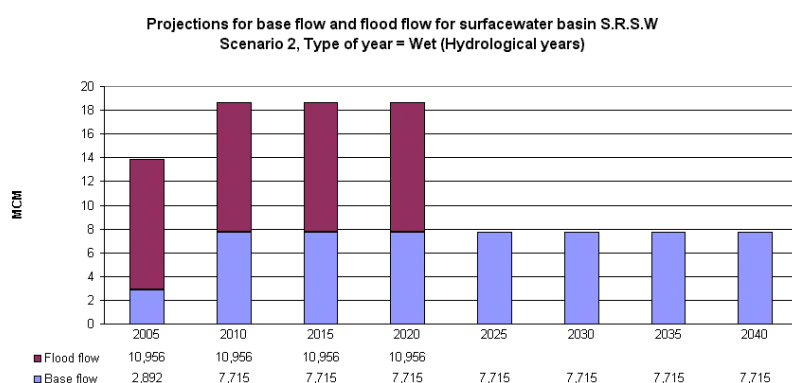
The projections for base flow and flood flow are the future resources estimations calculated by the sector managers by using the pre-processing modules. The base flow volumes are coming from the base flow pre-processing module, the flood flow is an output from the rainfall/runoff module. The results are stored in the Oracle WIS STP tables JORDAN.STP_BASEFLOW, JORDAN.STP_BASEFLOW_END and JORDAN.STP_FLOOD_FLOW_OUT per wadi endpoint or wadi segment, type of year, scenario, year and month. Additionally, the quality (salinity) parameters of the resource is written to this table. The type of year indicates, whether a planning year is dry, median or wet in the comparison with the hydrological history. The base flow resource, which was distributed along the wadi segments using the pre-processing module, is undergoing certain intersection procedures (see chapter 3.5.2).

The chart allows the comparison of base flow and flood flow, as both values are charted in stacked column bars.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 types of year 3 scenarios 	wadi endpoint/base flow segment. In the DVS the volumes cannot be charted for single base flow systems	<ul style="list-style-type: none"> nation governorates surface water basins groundwater basins

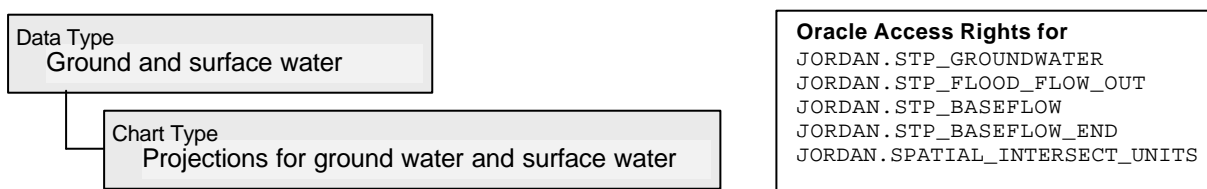
This parameter dialog offers a set of parameters to choose from. In the spatial selection window you select a spatial unit for aggregation of the projected base flow and flood flow. You can select one of the three scenarios, one of the three types of year. You chart the volumes without water quality consideration or you select one specific salinity class.

Sample results:



The chart shows the surface water resource, divided in flood flow and base flow. For the years greater than 2020 no flood flow was projected.

3.5.5 Chart Type: Projections for Ground Water and Surface Water



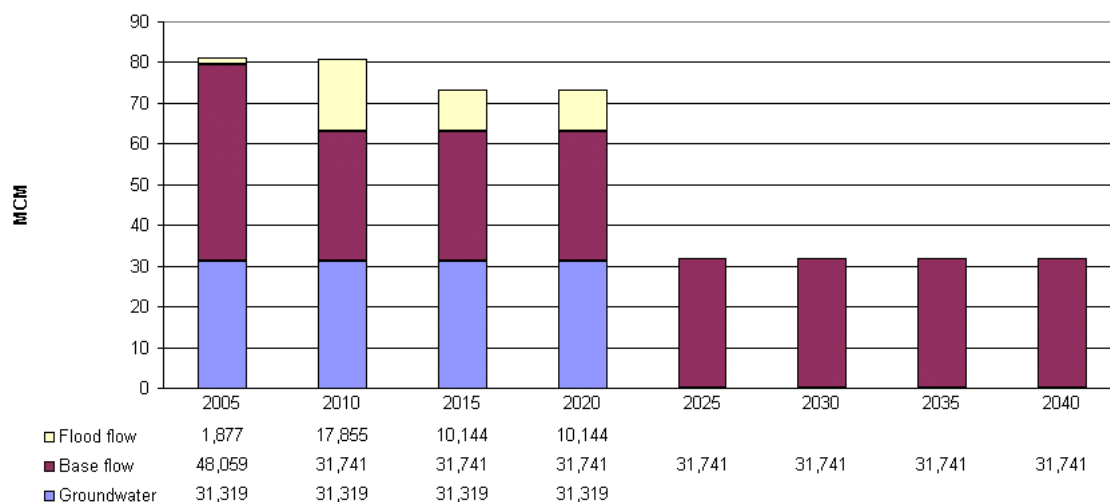
The projections for ground water and surface water are the future resources estimations calculated by the sector managers by using the pre-processing modules. The base flow volumes are coming from the base flow pre-processing module, ground water and flood flow figures are an output from the rainfall/runoff module. The results are stored in the Oracle WIS STP tables JORDAN.STP_GROUNDWATER, JORDAN.STP_BASEFLOW, JORDAN.STP_BASEFLOW_END and JORDAN.STP_FLOOD_FLOW_OUT per wadi type of year, scenario, year and month. Depending from the data type, they are stored per wadi endpoint, wadi segment or groundwater unit (see chapters 3.5.1 – 3.5.3). Additionally, the quality (salinity) parameters of the resource are written to these tables. The type of year indicates, whether a planning year is dry, median or wet in the comparison with the hydrological history. Groundwater and base flow resources, which are assigned to non-point sources, are undergoing certain intersection procedures (see chapter 3.5.1 and 3.5.2). The chart allows the comparison of all natural resources (groundwater, base flow and flood flow), as the three values are charted in stacked column bars.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 types of year 3 scenarios 	groundwater basin, wadi endpoint and base flow segment.	<ul style="list-style-type: none"> nation governorates surface water basins groundwater basins

This parameter dialog offers a set of parameters to choose from. In the spatial selection window you select a spatial unit for aggregation of the projected resources. You can select one of the three scenarios, one of the three types of year. You chart the volumes without water quality consideration or you select one specific salinity class.

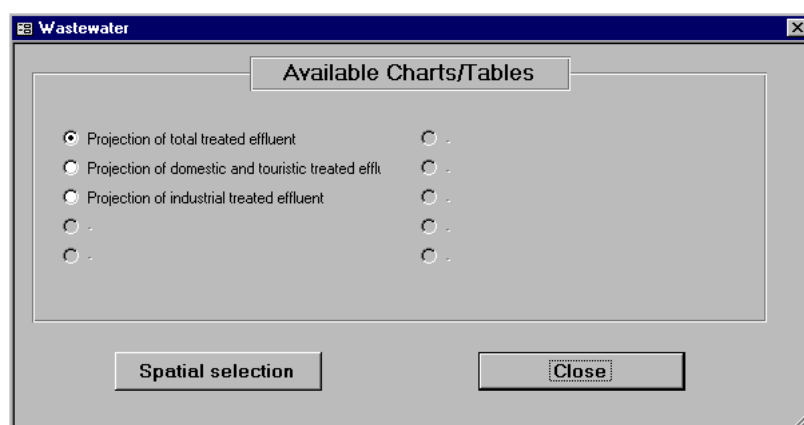
Sample results:

Projections for ground and surface water for governorate AL KARAK
Scenario 2, Type of year = Wet (Hydrological years)



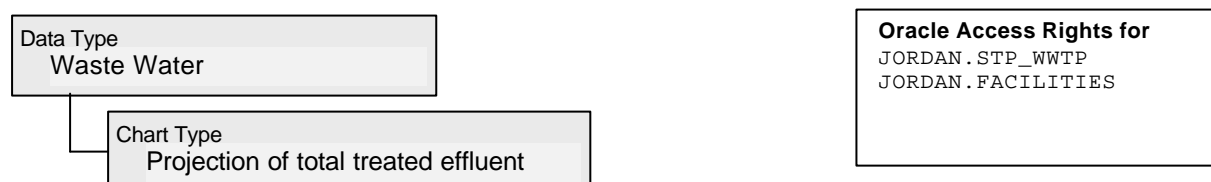
The chart shows the natural water resources for governorate Al Karak, divided in the three classes groundwater, flood flow and base flow. For the years greater than 2020 no groundwater and flood flow values were projected.

3.6. Data Type: Waste Water



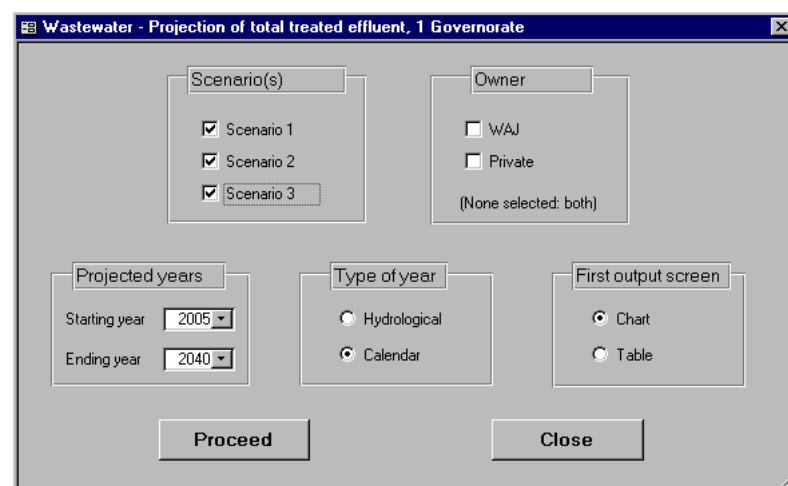
3 different chart types are available for the wastewater resources.

3.6.1 Chart Type: Projections of Total Treated Effluent



The Projection of total treated effluent are the future waste water resources estimations calculated by the sector managers by using the pre-processing modules. They are based on the estimated demand values (municipal, touristic, industrial). The values are stored in the Oracle WIS STP table JORDAN.STP_WWTP per Facility ID, scenario, year and month. Additionally, the quality (salinity) parameters of the resource is written to this table. The table JORDAN.FACILITIES stores information about the owner.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 scenarios 	Facility ID	<ul style="list-style-type: none"> nation governorates districts surface water basins service zones

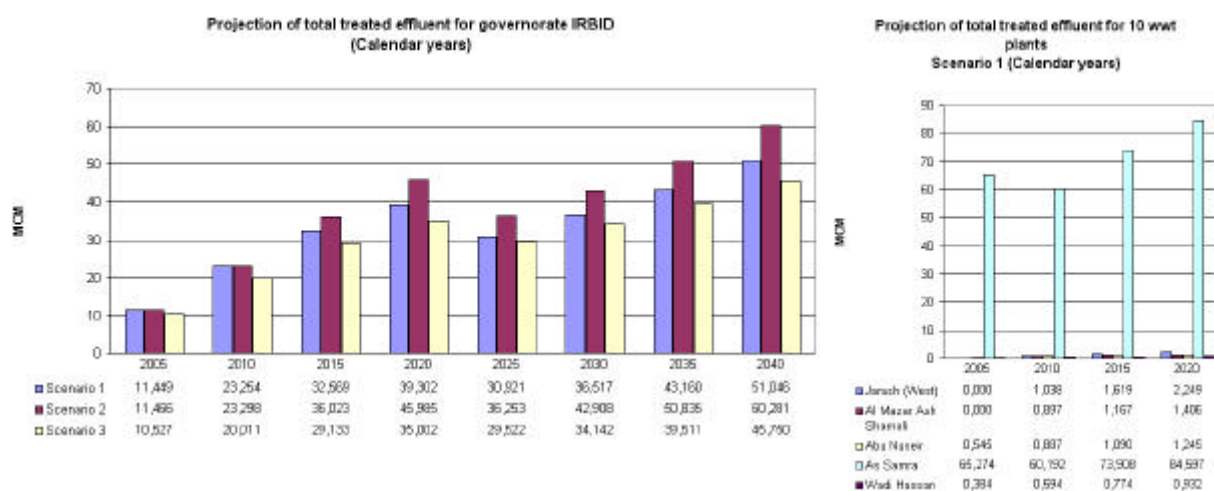


The “Projection of total treated effluent” parameter dialog offers a set of parameters to choose from. You choose one or more scenarios for plotting the chart, you can distinguish between plants by their owner. You have to indicate the years you are interested in.

Restrictions: If you want to plot more than one scenario in a chart, or if you want to distinguish by the plant owner you cannot select more than one treatment plant or aggregation unit in the spatial selection window. If you select two or more plants, the parameter dialog will not allow multiple selections in the scenario section.

	multiple governorates	multiple scenarios	considering owner
governorates	>1	1	1
scenarios	1	>1	1
owner	1 class or sum	1 class or sum	> 1 class

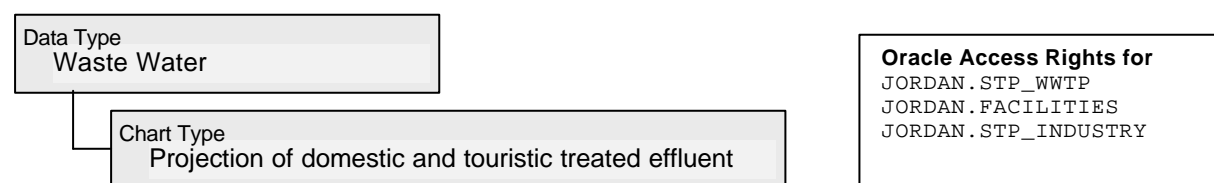
Sample results:



Comparison of the three scenarios for Irbid

Only for 5 of the ten selected treatment plants data is available.

3.6.2 Chart Type: **Projections of Domestic and Touristic Treated Effluent**



The Projection of total treated effluent are part of the future waste water resources estimations calculated by the sector managers by using the pre-processing modules. They are stored in the Oracle WIS STP table JORDAN.STP_WWTP per Facility ID, scenario, year and month. Additionally, the quality (salinity) parameters of the resource is written to this table. To calculate the domestic and touristic waste water, the industrial produced wastewater (JORDAN.STP_INDUSTRY) has to be subtracted from the total.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 scenarios 	Facility ID	<ul style="list-style-type: none"> nation governorates districts surface water basins service zones

Wastewater - Projection of domestic and touristic treated effluent, 1 Governorate

Scenario(s)
☒ Scenario 1
☐ Scenario 2
☐ Scenario 3

Owner
☐ WAJ
☐ Private
 (None selected: both)

Projected years
 Starting year: 2005
 Ending year: 2040

Type of year
☐ Hydrological
☒ Calendar

First output screen
☒ Chart
☐ Table

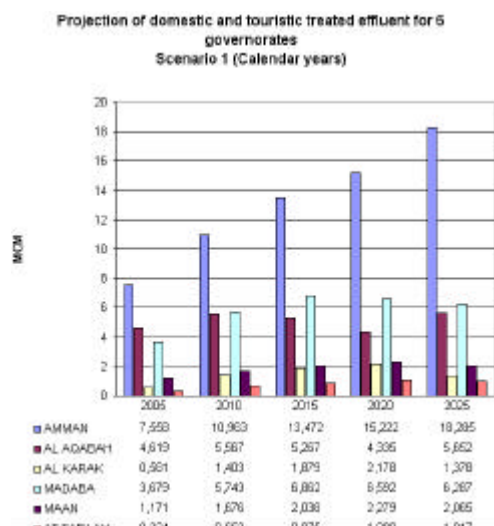
Proceed **Close**

The “Projection of domestic and touristic treated effluent” parameter dialog offers a set of parameters to choose from. You choose one or more scenarios for plotting the chart and you can distinguish between plants by their owner. You have to indicate the time period you are interested in.

Restrictions: If you want to plot more than one scenario in a chart, or if you want to distinguish by the plant owner you cannot select more than one treatment plant or aggregation unit in the spatial selection window. If you select two or more plants, the parameter dialog will not allow multiple selections in the scenario section.

	multiple governorates	multiple scenarios	considering owner
governorates	>1	1	1
scenarios	1	>1	1
owner	1 class or sum	1 class or sum	> 1 class

Results:



	A	B	C	D	E	F
1	Projection of domestic and touristic treated effluent for 6 governorates					
2	Scenario 1 (Calendar years)					
3						
4	Governorate	2005	2010	2015	2020	2025
5						
6	AMMAN	7,558	10,963	13,472	15,222	18,285
7	AL AQABAH	4,619	5,567	5,267	4,335	5,652
8	AL KARAK	0,581	1,403	1,879	2,178	1,378
9	MADABA	3,679	5,743	6,862	6,592	6,287
10	MAAN	1,171	1,676	2,038	2,279	2,065
11	AT TAFILAH	0,324	0,653	0,875	1,080	1,017
12						
13	Total	17,933	26,005	30,394	31,686	34,684
14						

table view of the left chart

3.6.3 Chart Type: Projections of Industrial Treated Effluent

Data Type
Waste Water

Chart Type
Projection of industrial treated effluent

Oracle Access Rights for
 JORDAN.FACILITIES
 JORDAN.STP_INDUSTRY

The Projection of industrial treated effluent are part of the future waste water resources estimations calculated by the sector managers by using the pre-processing modules. They are stored in the Oracle

WIS STP tables JORDAN.STP_WWTP per Facility ID, scenario, year and month. Additionally, the quality (salinity) parameters of the resource is written to this table. The treatment plant master file JORDAN.FACILITIES stores information about owner and type of the plant etc..

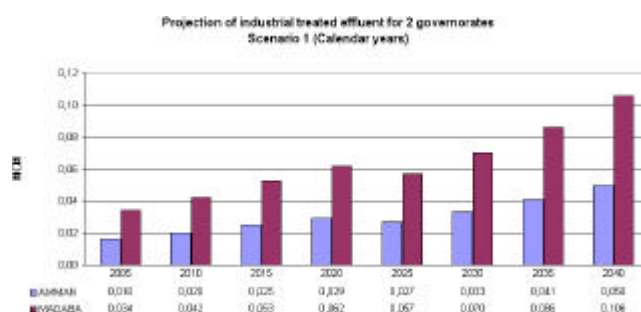
projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 scenarios 	Facility ID	<ul style="list-style-type: none"> nation governorates districts surface water basins service zones

The “Projection of industrial treated effluent” parameter dialog offers a set of parameters to choose from. You choose one or more scenarios for plotting the chart and you can distinguish between plants by their owner. You have to indicate the time period you are interested in.

Restrictions: If you want to plot more than one scenario in a chart, or if you want to distinguish by the plant owner you cannot select more than one treatment plant or aggregation unit in the spatial selection window. If you select two or more plants, the parameter dialog will not allow multiple selections in the scenario section.

	multiple governorates	multiple scenarios	considering owner
governorates	>1	1	1
scenarios	1	>1	1
owner	1 class or sum	1 class or sum	> 1 class

Results:

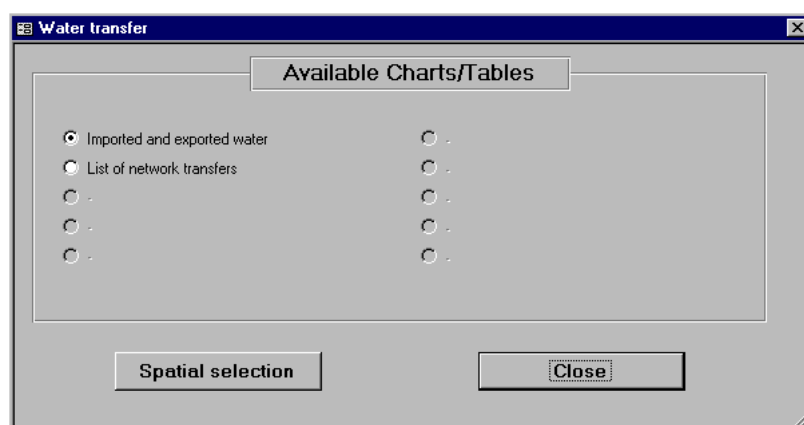


Projection of industrial treated effluent for the governorates Amman and Madaba.

	A	B	C	D	E
1	Projection of industrial treated effluent for 12 governorates				
2	Scenario 1 (Calendar years)				
3					
4	Governorate	2005	2010	2015	2020
5					
6	AMMAN	0,016	0,020	0,025	0,029
7	AL AQABAH	0,904	1,123	1,402	1,646
8	AL BALQA	0,089	0,111	0,138	0,162
9	IRBID	1,277	1,393	1,594	1,788
10	JARASH	0,000	0,000	0,000	0,000
11	MADABA	0,034	0,042	0,053	0,062
12	AL MAFRAQ	0,048	0,059	0,074	0,087
13	AZ ZARQA	1,778	2,296	2,891	3,499
14					
15	Total	4,146	5,045	6,177	7,273
16					

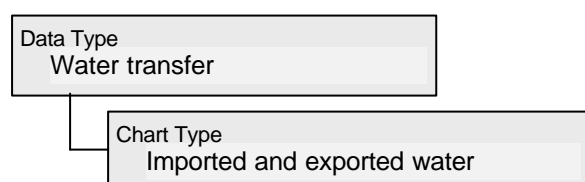
table view of the industrial treated effluent for all governorates of Jordan.

3.7. Data Type: **Water Transfer**



2 different chart types are available for the irrigation demands.

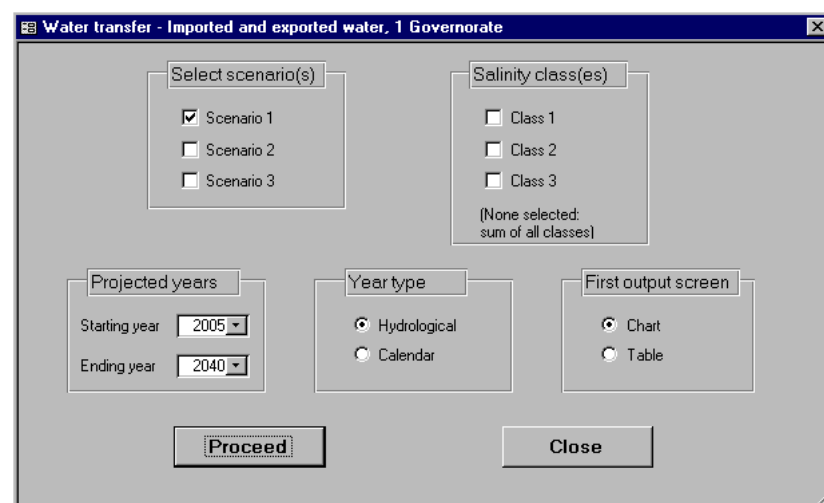
3.7.1 Chart Type: **Imported and Exported Water**



Oracle Access Rights for
 JORDAN.STP_TRANSFER
 JORDAN.STP_TRANSFER_LOSSES
 JORDAN.TRANSFER_POINTS

The Projection of imported and exported water are the future water transfer estimations calculated by the sector managers by using the pre-processing modules. They are stored in the Oracle WIS STP table JORDAN.STP_TRANSFER per transfer point, scenario, year and month. Additionally, quality (salinity) parameters of the water volumes is written to this table. The type of the transfer point (IN/OUT) is stored in the table JORDAN.TRANSFER_POINTS. The transfer losses occur as an additional demand at the transfer in point and are stored in the table JORDAN.STP_TRANSFER_LOSSES.

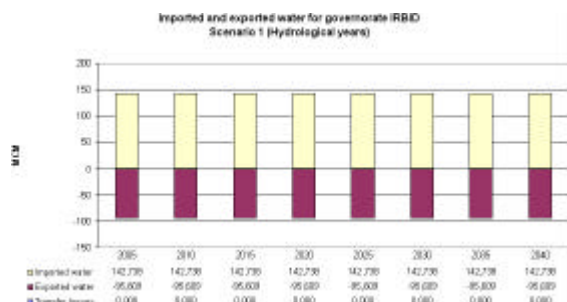
projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 15 months 8 planning horizons 3 scenarios 	-	<ul style="list-style-type: none"> nation governorates



The “Imported and exported water” parameter dialog offers a set of parameters to choose from. Selection of a scenario is compulsory, the selection of a salinity class optional. The user has to select the years he is interested in.

Restrictions: The three values water import, water export and transfer losses are drawn in stacked column charts using MS Excel. Due to restrictions under Excel, it is not possible to plot more than one scenario or more than one salinity class in one chart, as there are already several bars drawn for the different planning years. If you do not check any of the salinity check boxes, the program will not consider water quality and therefore summarize the water volumes of the different salinity classes.

Results:



	A	B	C	D	E
1	Imported and exported water for governorate IRBID				
2	Scenario 1 (Hydrological years)				
3					
4	Transfer type	2005	2010	2015	2020
5					
6	Transfer losses	0,000	0,000	0,000	0,000
7	Exported water	-95,609	-95,609	-95,609	-95,609
8	Imported water	142,738	142,738	142,738	142,738
9					
10	Total	47,129	47,129	47,129	47,129
11					

Imported and exported water for governorate Irbid

The table view of the left chart

3.7.2 Chart Type: List of Network Transfers

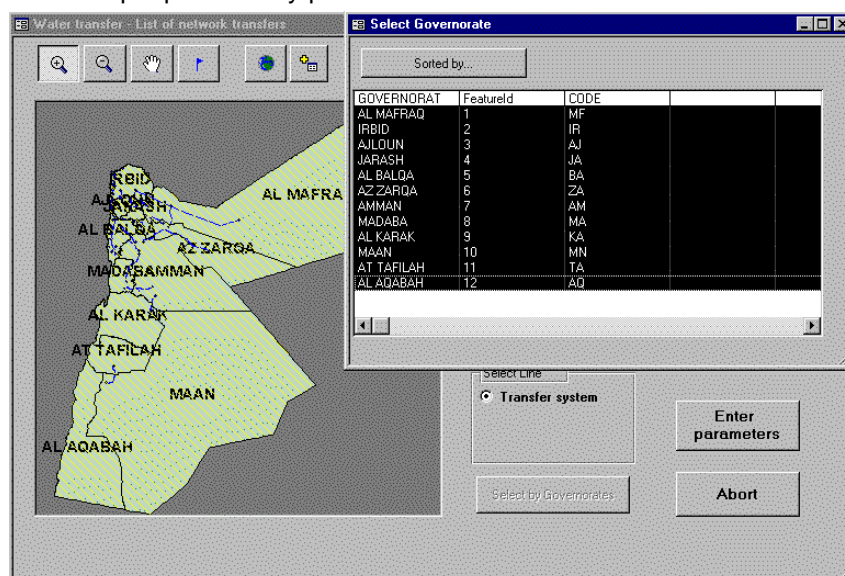
Data Type
Water transfer

Chart Type
List of network transfers

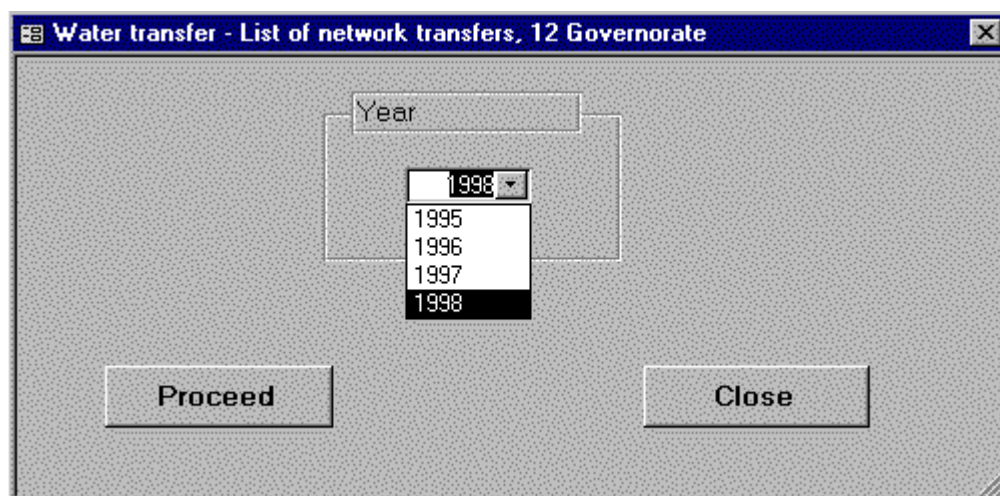
Oracle Access Rights for
 JORDAN.MONTHLY_PRODUCTION
 JORDAN.TRANSFER_SYSTEMS
 JORDAN.TRANSFER_POINTS

The list of network transfers gives the water volumes, which were transferred between the governorates in the past. The volumes were recorded and stored in the Oracle table JORDAN.MONTHLY_PRODUCTION. The network topology is implemented in the tables JORDAN.TRANSFER_SYSTEMS, JORDAN.TRANSFER_POINTS and JORDAN.TRANSFER_STATIONS. Every transfer system has a record in the table JORDAN.TRANSFER_SYSTEMS. All the related transfer points can be found in the points table JORDAN.TRANSFER_POINTS with an indicator, whether the point is an input point or an output point. Every point can have several connected stations. This relation is stored in the JORDAN.TRANSFER_STATI table. And for every station, there are values in the MONTHLY_PRODUCTION table. Refer to the documentation of the transfer pre-processing module for details.

This SQL query result comes as a cross table without an Excel chart. It makes sense to select all governorates of the kingdom using the table selection option in the spatial selection window.



After the selection of the governorates, the DVS program checks the data availability within the historical period of 10 years. The list of years where data is available (was recorded) is given in the following window where the user makes his selection.



The resulting spread sheet gives the water transfer matrix of all governorates which are linked by the existing transfer system.

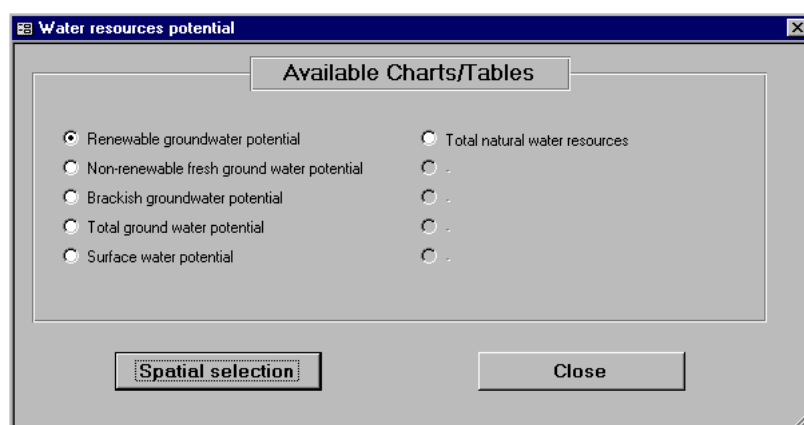
historical values for	detailed reference	aggregated for
variable, depends on the transfer system	-	<ul style="list-style-type: none"> • nation • governorates

Results:

	A	B	C	D	E	F	G	H	I
1	Transferred water between governorates in 1998								
2									
3	From \ To	AL BALQA	AL MAFRAQ	AMMAN	AZ ZARQA	IRBID	JARASH	MAAN	MADABA
4	AJLOUN					475703			
5	AL BALQA			489149		95741800	107894760		
6	AL KARAK			218777					
7	AL MAFRAQ				150030				
8	AMMAN	542599			17606301				5202039
9	AT TAFILAH							523125	
10	AZ ZARQA		13945955						
11	IRBID	105376399	3099203						
12	JARASH		319756		297018	713558			
13	MADABA			5774349					

The Excel spreadsheet shows the matrix of the transferred water volumes for 1998.

3.8. Data Type: **Water Resources Potential**



6 different chart types are available for the irrigation demands.

3.8.1 Chart Type: **Renewable groundwater Potential**

Data Type
Water resources potential

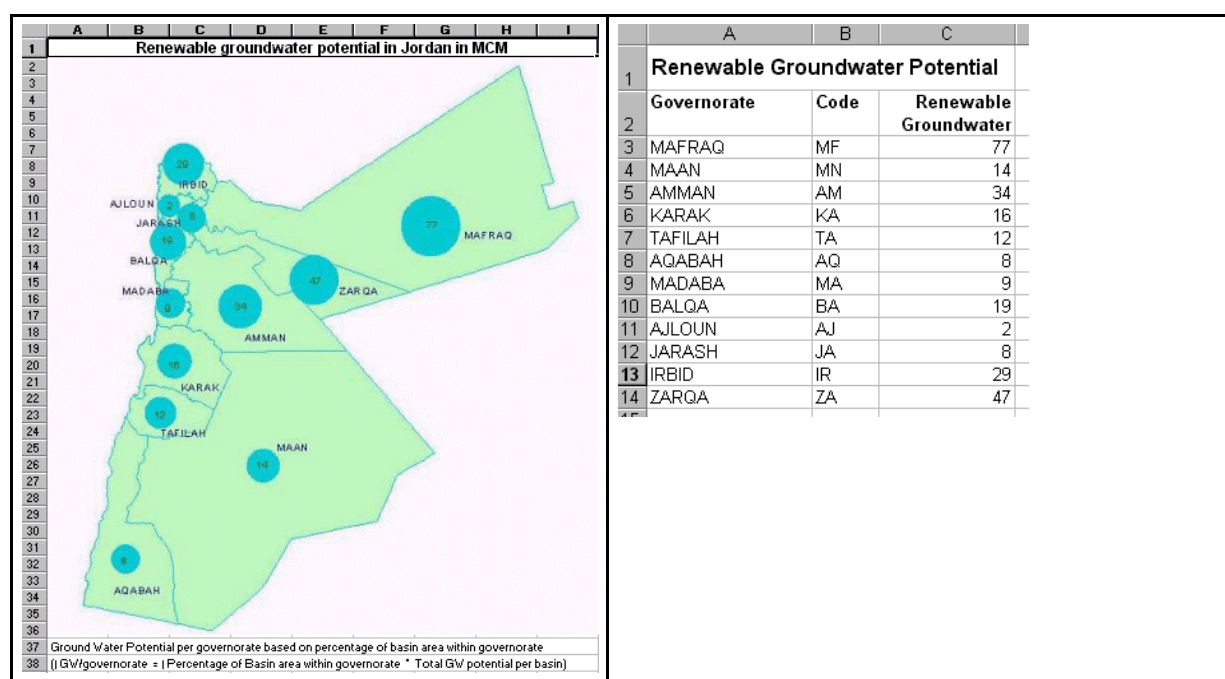
Chart Type
Renewable groundwater potential

Oracle Access Rights for
NONE

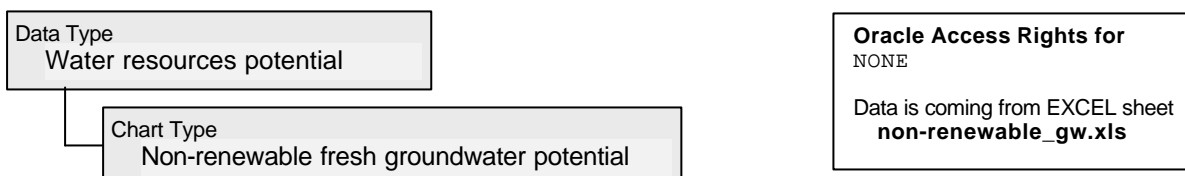
Data is coming from EXCEL sheet
renewable_gw.xls

The renewable groundwater potential is the output of the JICA study. The groundwater volumes are aggregated for the 12 governorates of Jordan. It is available as an MS Excel table and an ArcView map for visualization. The DVS loads both the static table and the static map view to the MS Excel environment.

Static values! The values does not come from the Oracle WIS. Data source is an Excel sheet!

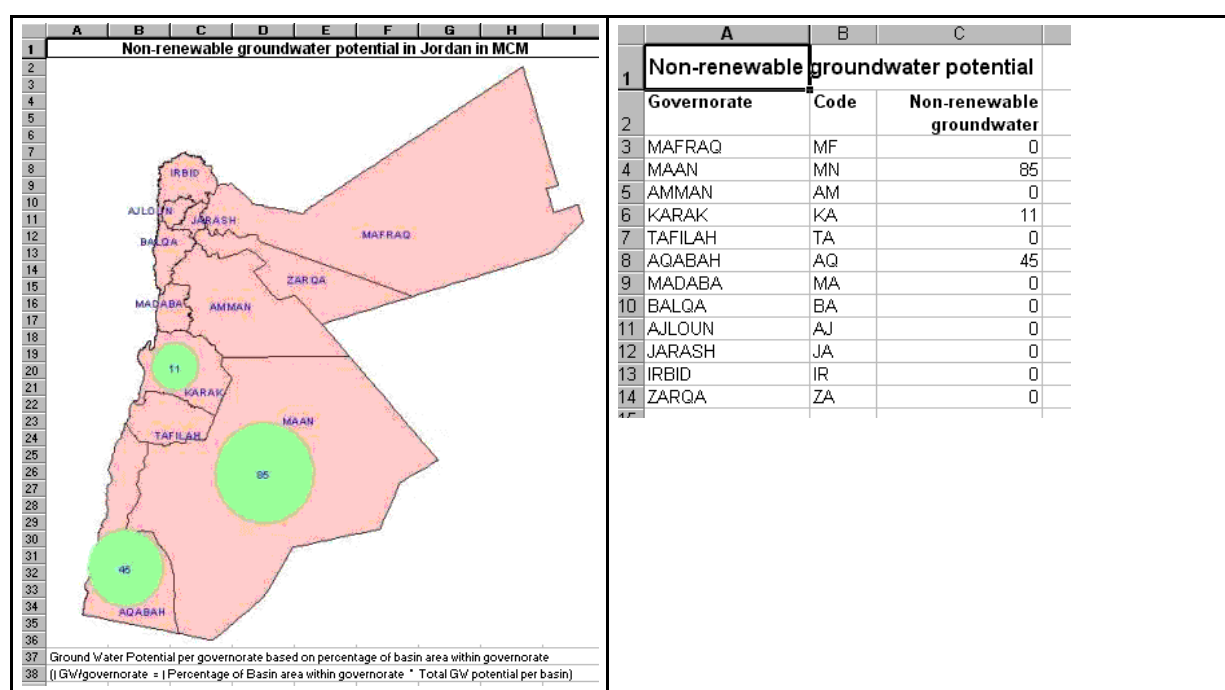


3.8.2 Chart Type: **Non-Renewable Fresh Groundwater Potential**



The non-renewable fresh groundwater potential is the output of the JICA study. These “fossil” groundwater volumes of salinities below a certain value are aggregated for the 12 governorates of Jordan. The values are available as an MS Excel table and an ArcView map for visualization. The DVS loads both the static table and the static map view to the MS Excel environment.

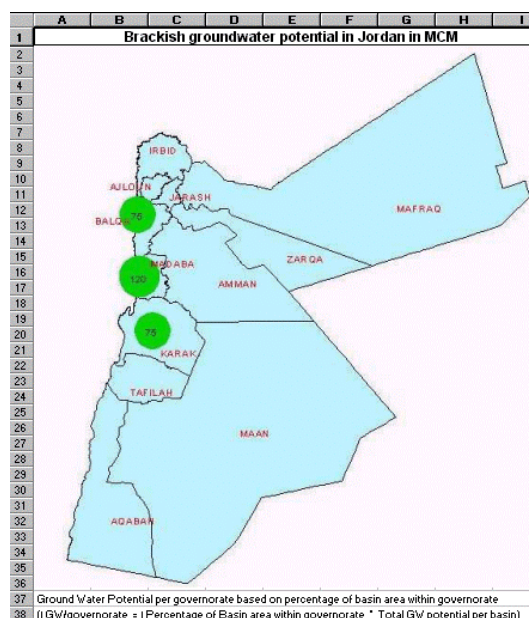
Static values! The values does not come from the Oracle WIS. Data source is an Excel sheet!



3.8.3 Chart Type: Brackish Groundwater Potential

Data Type
Water resources potential

Chart Type
Brackish groundwater potential



The brackish groundwater potential is the output of the JICA study. These “fossil” groundwater volumes with a salinity above a certain limit are aggregated for the 12 governorates of Jordan. The values are available as an MS Excel table and an ArcView map for visualization. The DVS loads both the static table and the static map view to the MS Excel environment.

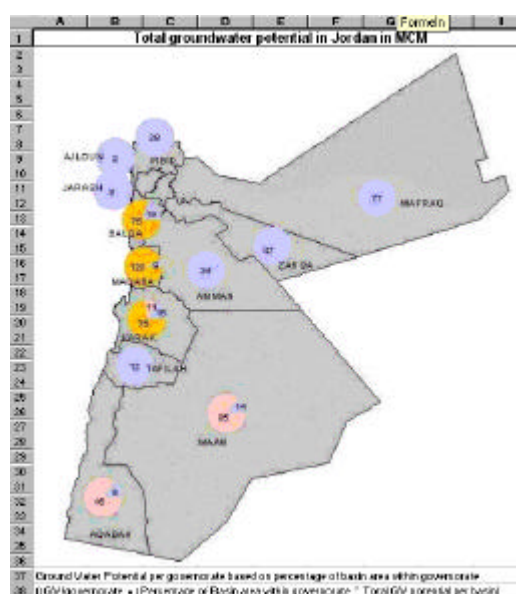
Static values!

**The values does not come from the Oracle WIS.
 Data source is an Excel sheet**

3.8.4 Chart Type: Total Groundwater Potential

Data Type
Water resources potential

Chart Type
Total groundwater potential



The total groundwater potential is the output of the JICA study. These “fossil” groundwater volumes of all salinities are aggregated for the 12 governorates of Jordan. The values are available as an MS Excel table and an ArcView map for visualization. The DVS loads both the static table and the static map view to the MS Excel environment.

Static values!

**The values does not come from the Oracle WIS. Data
 source is an Excel sheet!**

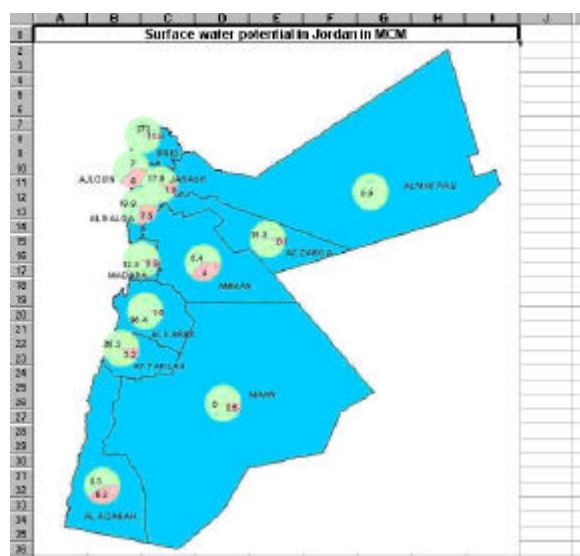
3.8.5 Chart Type: Surface Water Potential

Data Type
Water resources potential

Chart Type
Surface water potential

Oracle Access Rights for
NONE

Data is coming from EXCEL sheet
surface_water.xls



The surface water potential is the output of the JICA study. No subdivision in flood flow and base flow was made. The values are available as an MS Excel table and an ArcView map for visualization. The DVS loads both the static table and the static map view to the MS Excel environment.

Static values!

The values does not come from the Oracle WIS.
Data source is an Excel sheet

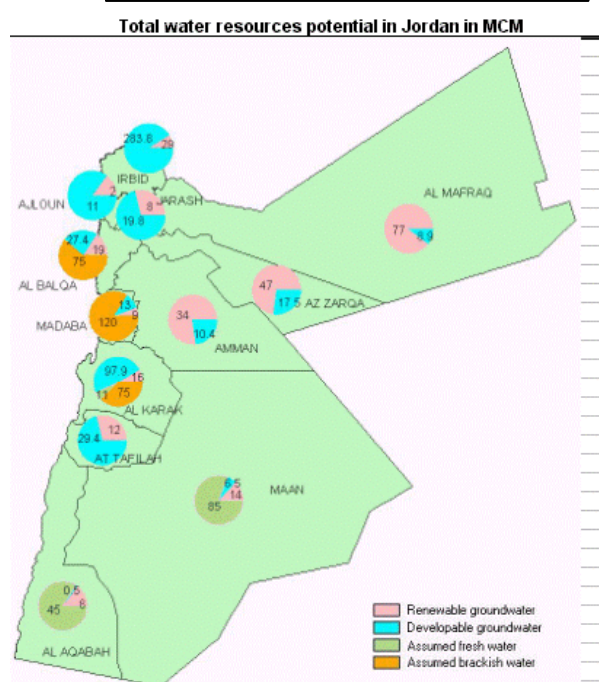
3.8.6 Chart Type: Total Natural Water Resources

Data Type
Water resources potential

Chart Type
Total natural water resources

Oracle Access Rights for
NONE

Data is coming from EXCEL sheet
total_resources.xls



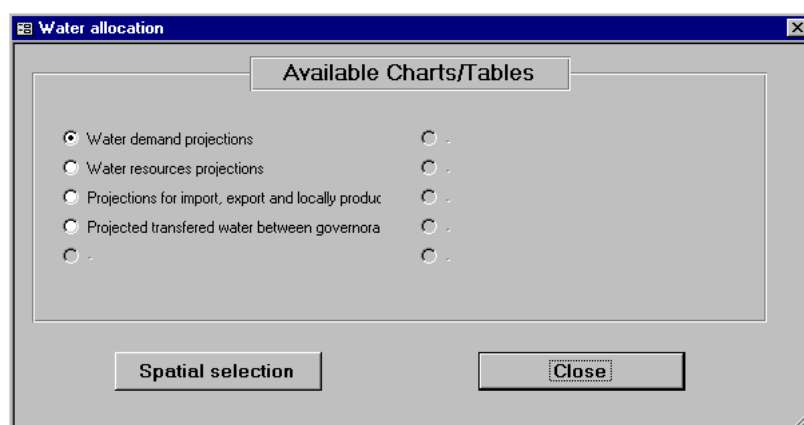
The total natural water resources are the sum of the total groundwater resources and the total surface water resources. is the output of the JICA study. No subdivision in flood flow and base flow was made. The values are available as an MS Excel table and an ArcView map for visualization. The DVS loads both the static table and the static map view to the MS Excel environment.

Static values!

The values does not come from the Oracle WIS.
Data source is an Excel sheet

Ground Water Potential per governorate based on percentage of basin area within governorate
 (I GV/governorate = I Percentage of Basin area within governorate * Total Gw/ potential per basin)

3.9. Data Type: **Water Allocation**



4 different chart types are available for water allocation.

3.9.1 Chart Type: **Water Demand Projections**

Data Type
Water Allocation

Chart Type
Water demand projections

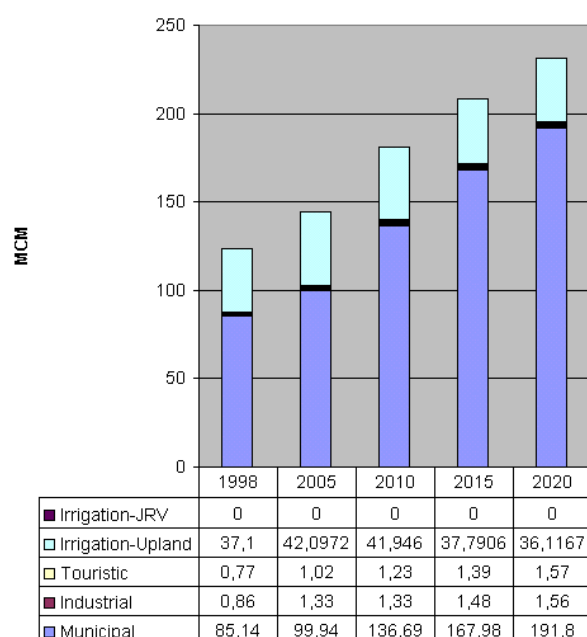
Oracle Access Rights for
NONE

Data is coming from EXCEL sheet
VIZ-R-DSummary.xls

The estimated and calculated values for the projected water demand (2005-2020) is an output of the JICA studies. The historical year of 1998 was added to the projections as a reference. The values are available on a governorate-level and they are stored in Excel sheets. The DVS allows the spatial selection of one governorate or the whole nation. The program extracts the estimated water volumes from the Excel sheet and arranges them in standardized charts under MS Excel.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 1 historical year 4 planning horizons 	-	<ul style="list-style-type: none"> nation one governorate

Demand projections for governorate Madaba



Restrictions: You can select only one governorate in the spatial selection window. As the demand is classified in 5 demand types which are plotted in Stacked Column charts, the restrictions of MS Excel do not allow to plot several governorates in one chart.

Static values!

The values does not come from the Oracle WIS. Data source is an Excel sheet

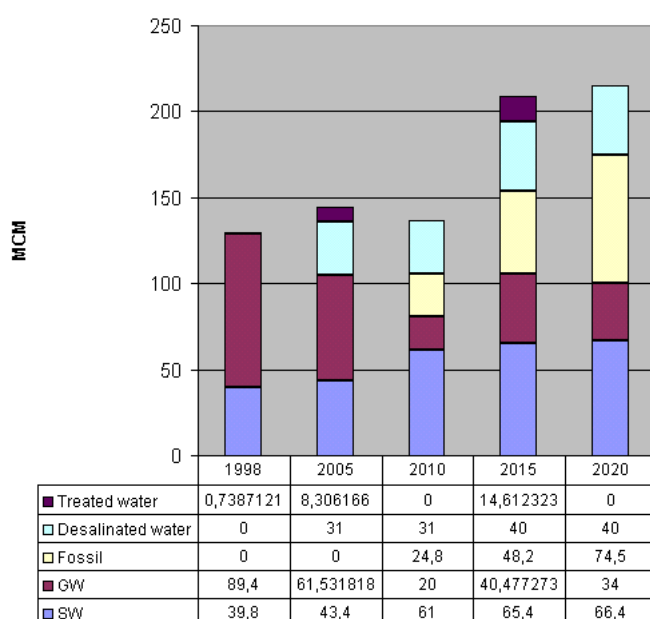
3.9.2 Chart Type: **Water Resources Projections**



The estimated and calculated values for the projected water resources (2005-2020) is an output of the JICA studies. The historical year of 1998 was added to the projections as a reference. The values are available on a governorate-level and they are stored in Excel sheets. The DVS allows the spatial selection of one governorate or the whole nation. The program extracts the estimated water volumes from the Excel sheet and arranges them in standardized charts under MS Excel.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 1 historical year 4 planning horizons 	-	<ul style="list-style-type: none"> nation governorates

Water resources projections in governorate Ma'an

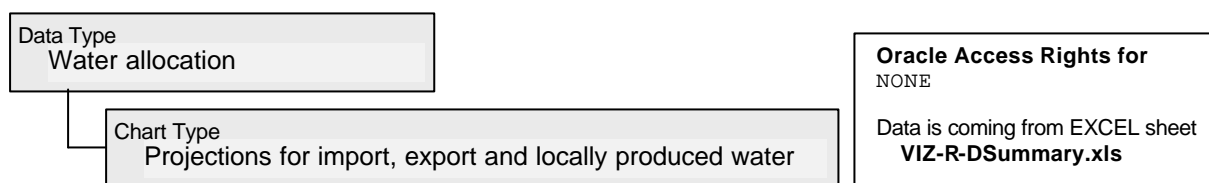


Restrictions: You can select only one governorate in the spatial selection window. As the resources are classified in 5 resource types which are plotted in Stacked Column charts, the restrictions of MS Excel do not allow to plot several governorates in one chart.

Static values!

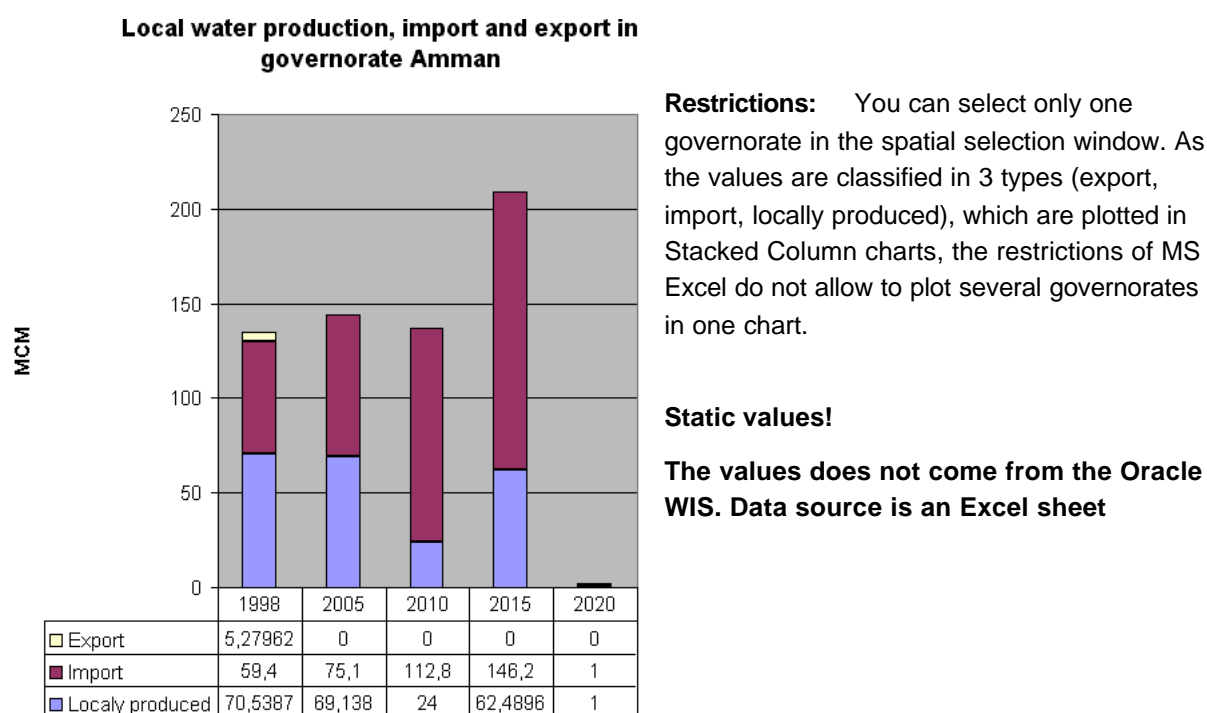
The values does not come from the Oracle WIS. Data source is an Excel sheet

3.9.3 Chart Type: **Projections for Import, Export and Locally Produced Water**

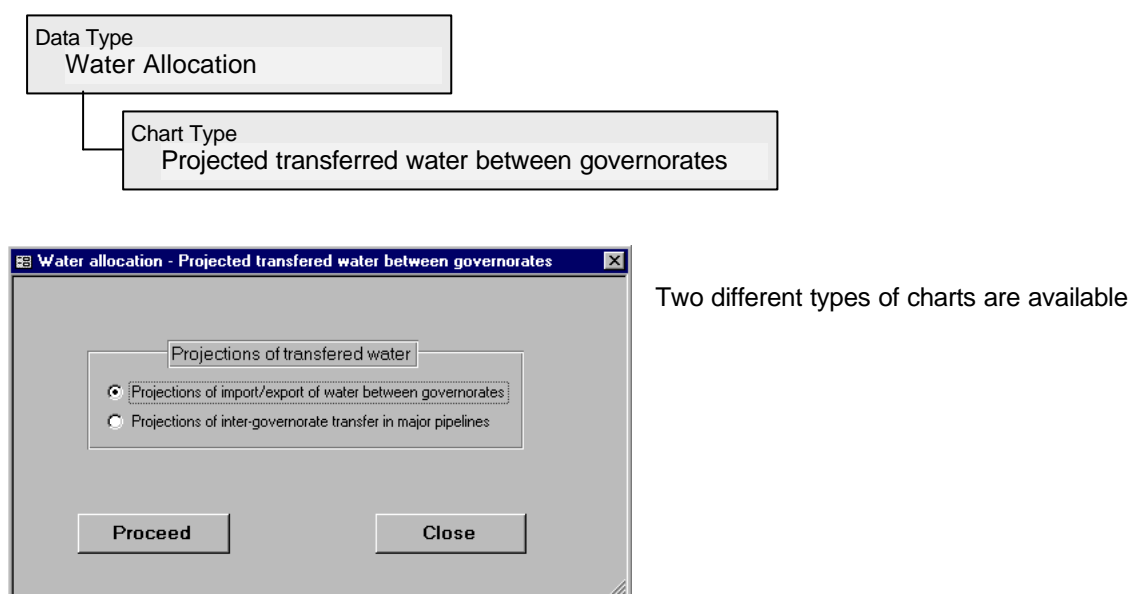


The estimated and calculated values for the projected water import, export and production (2005-2020) is an output of the JICA studies. The historical year of 1998 was added to the projections as a reference. The values are available on a governorate-level and they are stored in Excel sheets. The DVS allows the spatial selection of one governorate or the whole nation. The program extracts the estimated water volumes from the Excel sheet and arranges them in standardized charts under MS Excel.

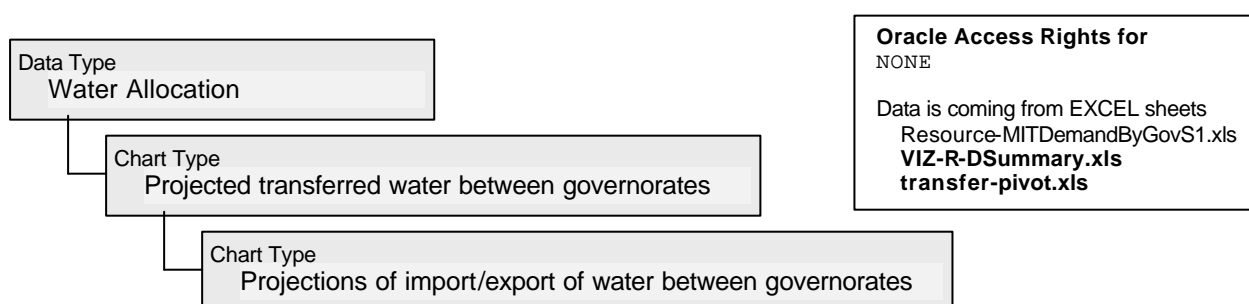
projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 1 historical year 4 planning horizons 	-	<ul style="list-style-type: none"> nation governorates



3.9.4 Chart Type: **Projected Transferred Water between Governorates**



3.9.4.1 Chart Type: **Projections of Import/Export of Water between Governorates**



The estimated and calculated values for the projected import and export of water between governorates is an output of the JICA studies. The values are available in several Excel sheets. One of them is a complex pivot table which allows user interaction and which links the base data from the other two spread sheets. Due to the complexity of the data which is involved in each graph, this system was implemented differently than all the other systems in the DVS.

The graphs can show all the following parameters:

- Projected years
- Importing Governorate
- Exporting Governorate
- Type of water imported
- Purpose of water use
- Quantity of water imported.

The visualization is done again under EXCEL but using a pivot table that contains all the data that needs to be visualized linked to a charting system that changes according to changes made in the pivot table. A detailed description of the Excel application is given in Annex A2.

The number of charts that can be generated is only dependent on the imagination of the user, it depends on what the user wants from the chart.

3.9.4.2 Chart Type: **Projections of Inter-Governorate Transfer in Major Pipelines**

Data Type
Water Allocation

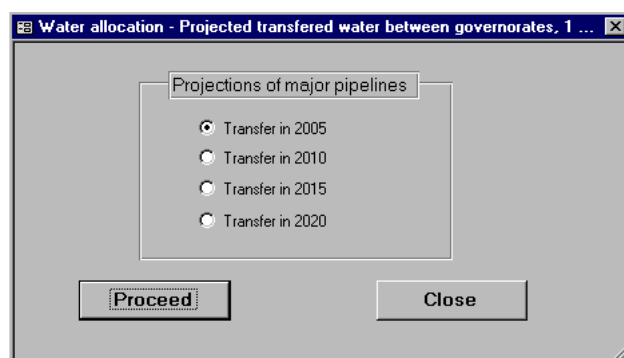
Chart Type
Projected transferred water between governorates

Chart Type
Projections of inter- governorate transfer in major pipelines

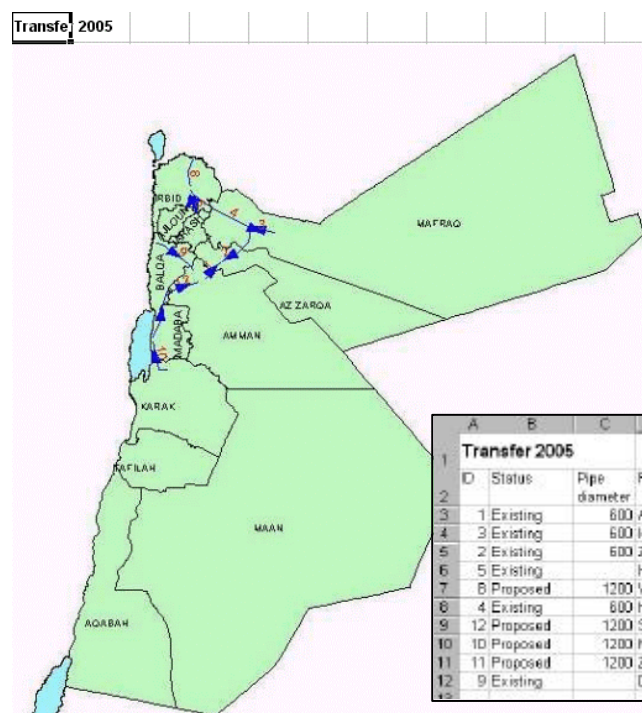
Oracle Access Rights for
 NONE
 Data is coming from EXCEL sheets
transfer-2005.xls
transfer-2010.xls
transfer-2015.xls
transfer-2020.xls

The estimated and calculated values for the projected inter-governorate transfer (2005-2020) is an output of the JICA studies. The values are available in an ArcView project. For every planning horizon, a Screenshot of a map showing the transfer volumes was prepared and stored on Excel sheets. The DVS asks for the year of interest and shows the map and its base table in MS Excel.

projections for	detailed reference	aggregated for
<ul style="list-style-type: none"> 4 planning horizons 	-	<ul style="list-style-type: none"> nation, showing details on the transfer lines



The water volumes were estimated/calculated for the next 4 planning horizons.



Static values!

The values does not come from the Oracle WIS. Data source is an ArcView map viewer, the screenshot was stored to an Excel sheet, the base values are available in an Excel table.

A	B	C	D	E	F	G	H
Transfer 2005							
ID	Status	Pipe diameter	From	To	T.V MCM Y	T.V OTHER	T.V LOCAL
3	1 Existing	600	Abu-Alanda reservoir (AM)	Khaw pump station (AM)	0	0	0
4	3 Existing	600	KM124 pump station (MF)	Zatary pump station (ZA)	11	11	0
5	2 Existing	600	Zatary pump station (MF)	Khaw pump station (AM)	11	11	0
6	5 Existing		Houfa pump station (IR)	Ajloun/Jerash (AJ/JA)	1	1	0
7	8 Proposed	1200	Wehda Dam WTP (IR)	Zabala reservoir (IR)	22	0	22
8	4 Existing	600	Houfa pump station (IR)	Zatary pump station (ZA)	0	0	0
9	12 Proposed	1200	Swima PS (BA)	Muntazah (National Park) PS (AM)	32	31	1
10	10 Proposed	1200	Mujib reservoir (KA)	Zara/Main reservoir (MA)	32	31	1
11	11 Proposed	1200	Zara/Main DS (MA)	Swima PS (MA)	35	25	11
12	9 Existing		Deir Alla PS (BA)	Dabouq reservoir (AM)	43	36	7

The attributes behind the Maps are as shown below:

Pipe-line No.	Year	Proposed/Existing	Pipe Dia. (mm)	From	To	Transfer Volume Total (MCM/year)	Transfer Volume to Other Gov. (MCM/year)	Transfer Volume Consumed Locally (MCM/year)
1	2005	Existing	600	Abu-Alanda reservoir	Khaw pump station	0	0	0
2	2005	Existing	600	Zataray pump station	Khaw pump station	11	11	0
3	2005	Existing	600	KM124 pump station	Zatary pump station	11	11	0
4	2005	Existing	600	Houfa pump station	Zatary pump station	0	0	0
5	2005	Existing	200/400	Houfa pump station	Ajloun/Jerash	1	1	0
6	2005	---	---	Qastal PS	Madaba PS	--	--	--
7	2005	---	---	Branch PS	Ma'an reservoir	--	--	--
8	2005	Proposed	1200	Wehda Dam WTP	Zabda reservoir	22	0	22
9	2005	Existing	1200/1200 x 2 lines	Deir Alla PS	Dabouq reservoir	43	36	7
10	2005	Proposed	1200	Mujib reservoir	Zara/Ma'in reservoir	32	31	1
11	2005	Proposed	1200	Zara/Ma'in DS	Sweima PS	36	25	11
12	2005	Proposed	1200	Sweima PS	Muntazah (National Park) PS	32	31	1
13	2005	---	---	Disi Transmission PS	Abu Alanda reservoir	---	---	---