

Geographic Information System (GIS) for Groundwater Resources Assessment

**By
Salah M Hamad**

**Faculty of Natural resources
and Environmental Sciences**

What GWIS

Groundwater information system (GWIS) is the key for groundwater resource assessment, and management where different levels of stakeholders for example:

- **Strategy analyst**
- **Project and Resource Planners and Managers**
- **Business Planners and Managers**
- **Advanced Researchers**
- **Elementary Researchers**
- **Water contractors**
- **Public**

Need access to realistically precise data to allow them to monitor the precious groundwater resources, assess supply & demand, as well as maintain the integrity and reliability of all such information.

Groundwater DATA

Aquifer Parameters

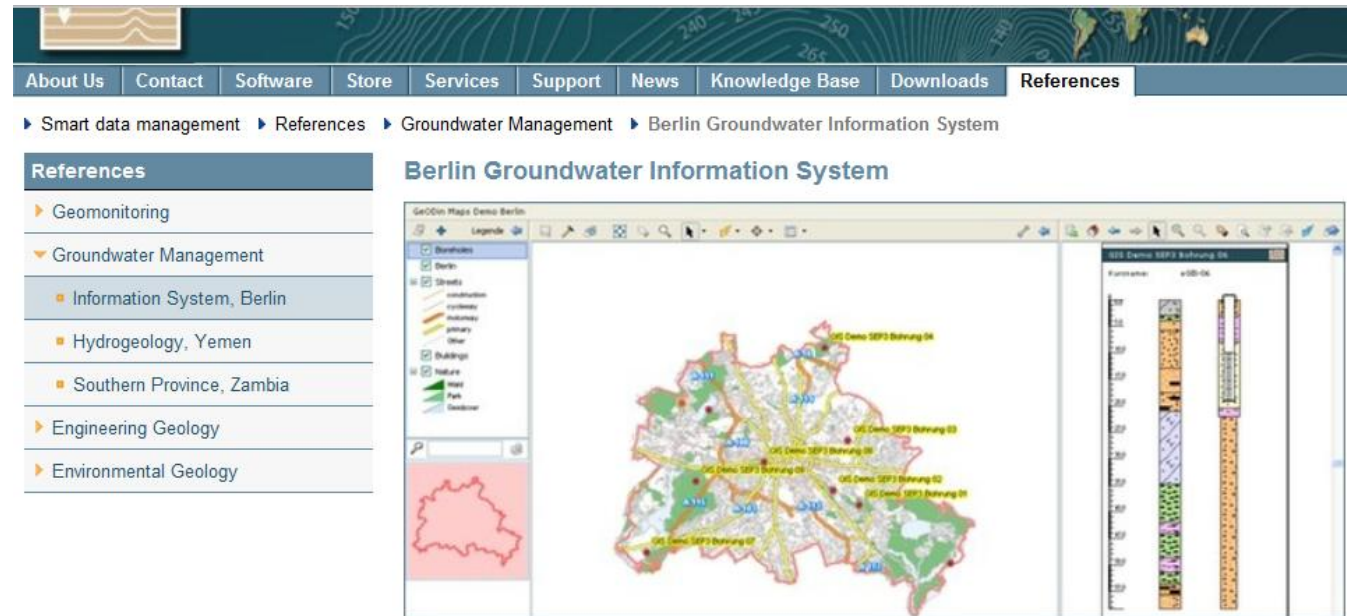
Hydrochemical data

Lithological data

Example of GWIS

The local authority of Berlin (Senatsverwaltung von Berlin)

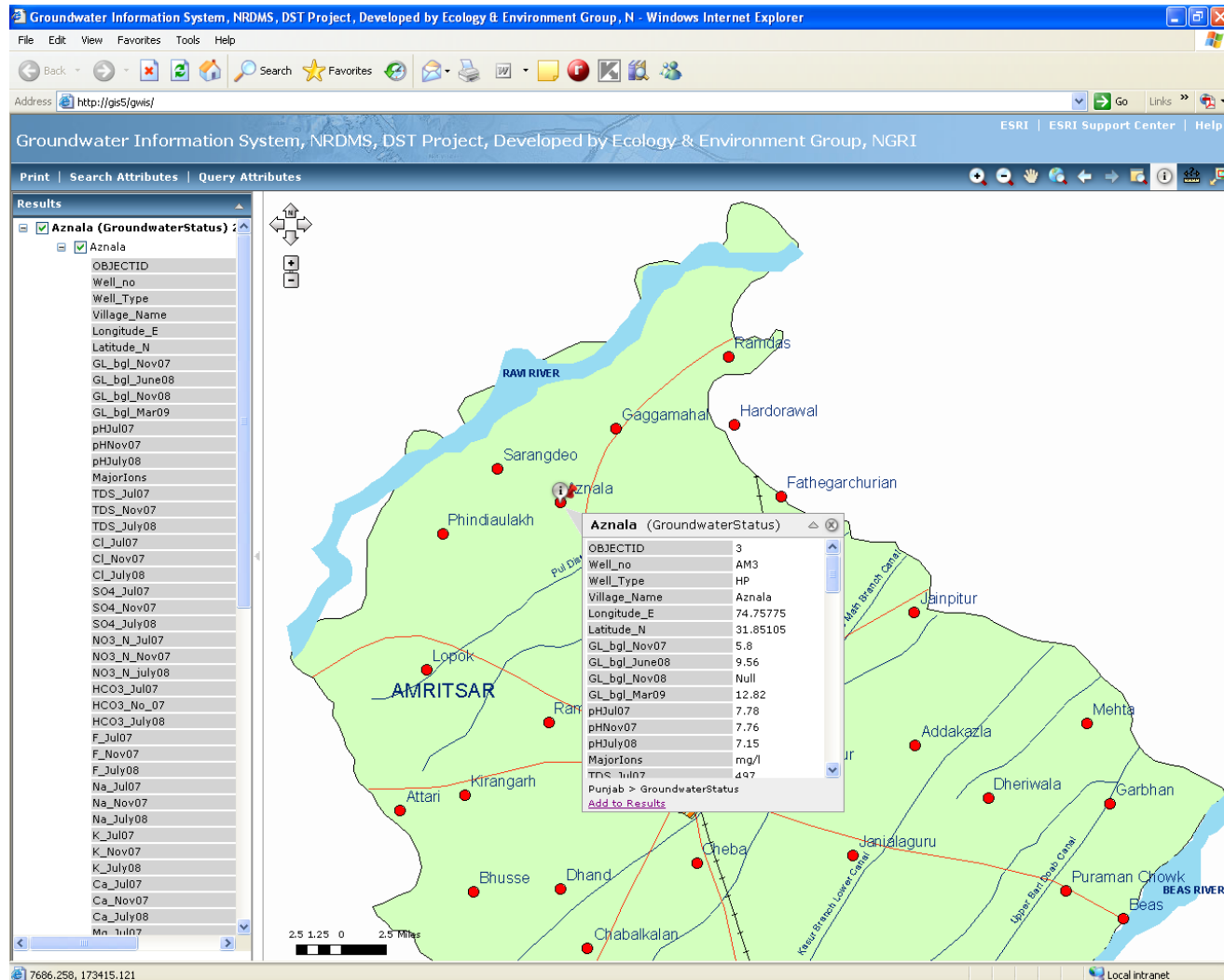
Uses the GeODin platform developed by FUGRO CONSULT GMBH



1-Regional database comprises 130000 boreholes with log profiles, 8000 wells

2-Several thousand chemical groundwater analysis and Over 6 million water levels

Example of GWIS



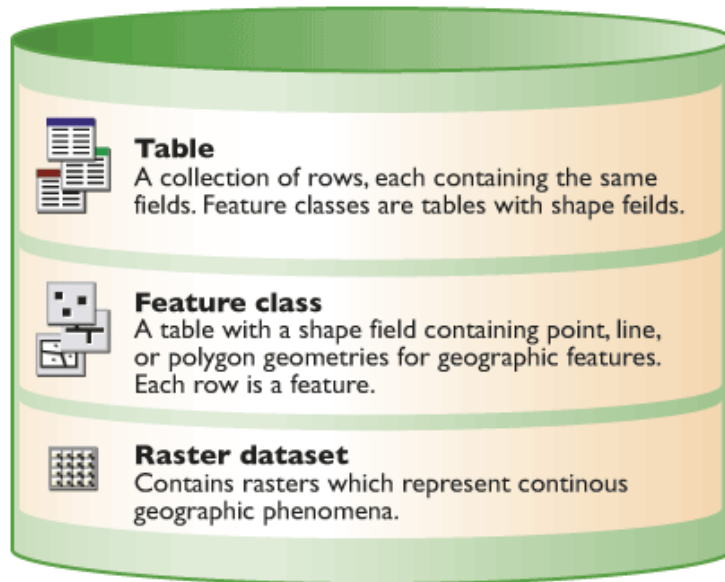
Hyderabad has released the Groundwater Information System for Farmers and Policymakers developed by Ecology and Environment Group

Water Institutions in Al Jabal Al Akhdar

- 1.The General Water Authority (GWA)**
- 2.The General Company for Water and Wastewater (GCWW)**
- 3.The Environmental General Authority**
- 4. Agriculture**

Lack and quality of data
No integration

GWIS => Geodatabase



Field Name	Data Type
Well_No	Text
Area	Text
Easting	Number
Northing	Number
Elevation	Number
Depth	Number
Drilling_Year	Number
Owner	Text
Contractor	Text
Aquifer_age	Text
Static_Water_Level	Number
Potentiometric_Level	Number
Electric_Conductivity	Number
TDS	Number
Total_Hardness	Number
pH	Number
K__Potassium	Number
Na_Sodium	Number
Ca_Calcium	Number
Mg_Magnesium	Number
Sum Anions	Number
SAR	Number
HCO3_Bicarbonate	Number
Alkalinity	Text
Cl_Chloride	Number
SO4_Sulfate	Number
Remarks	Text

Pumping Test Data Structure					
Data Entry	No. of Characters	Data Type	Format	No. of Decimal digit	Unit
Well Ident.	10	Well			
TestDate	10	Date	dd.mm.yy		
Distance	10	Numerical (Dim)	Fixed	2	Meter
AvgPRate	15	Numerical (Dim)	Float	7	m3/day
Duration	15	Numerical (Dim)	Float	7	m3/day
InsatTh	15	Numerical (Dim)	Fixed	2	M
Transmissivity	15	Numerical (Dim)	Float	7	M2/day
Storage	15	Numerical (Und)	Float	7	
Leakance	15	Num (Dim)	Float	7	1/day
ConfAqthickness	10	Numerical (Dim)	Fixed	2	M
B	10	Numerical (Dim)	Fixed	2	m
L	10	Numerical (Dim)	Fixed	2	M
D	10	Numerical (Dim)	Fixed	2	M
L1	10	Numerical (Dim)	Fixed	2	M
B	10	Numerical (Dim)	Fixed	2	M
D1	10	Numerical (Dim)	Fixed	2	M
StandardError	10	Numerical (Dim)	Fixed	2	M
Mrthod	25	Character			

GWIS =>Data Input Interface

WDGIS - [IOWW]

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Type a question for help

Water Wells Data Entry Form

Well_No	R1	Na Sodium	812	Accept/Reject	
Area	Msus	Ca Calcium	286.2	Water Type	
Easting	491732.6	Mg Magnesium	138.9	Remarks	0
Northing	3501922	SAR	10.1		
Elevation	155	HCO3_Bicarbonate	158.7		
Depth	256	Cl Chloride	1615		
Drilling Year	1975	SO4 Sulfate	650		
Owner	Agriculture Development Coun	Alkalinity			
Contractor	Franlab	Relaiability Test			
Aquifer age	Eocene	Calculated Electric Con	7696.4	=TDS/0.56	
Static Water Level	156.5	Calculated TDS	3673.4	=K+Na+Mg+Ca+Cl+So4+HCO3	
Potentiometric Level	-1.5	Sum cations	1249.7	=K+Na+Mg+Ca	
Electric Conductivity	7696	Sum Anions	2423.7	=Cl+So4+HCO3	
Total Hardness	1285	Anion cation Balance	-8.7	+ - 15 % accept	
TDS	4500	Ec_m_V_ion Sum		0.9 < Ec_m_V_ion Sum < 1.1	
		Ec_mV_Ec_c	1.001	0.9 < Ec_mV_Ec_c < 1.1	
		TDS_c_V_TDS_m	0.9	0.55 < TDS_c_V_TDS_m < 0.7	

Calculated fields

Potentiometric Level -1.5

SAR 10.02531383

Relaiability Test

Calculated Electric Con 8035.7

Calculated TDS 3673.4

Sum Cations 1249.7

Sum Anions 2423.7

Anion cation Balance 95.765

Ec_m_V_ion Sum

Ec_mV_Ec_c 1.0441

TDS_c_V_TDS_m 0.8163

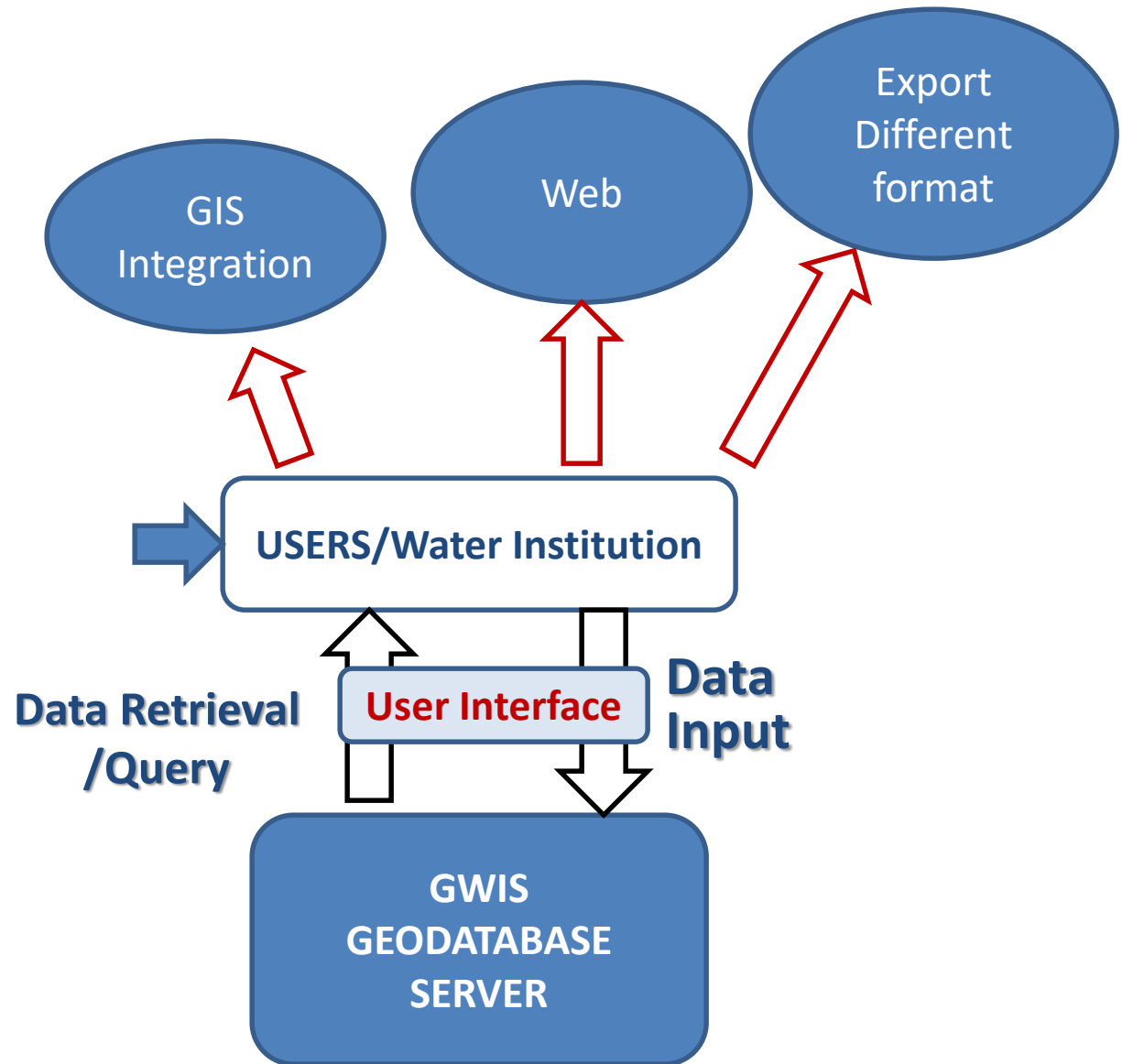
TDS_m_V_Ec_m 0.5847

Record: 1 of 94

Form View

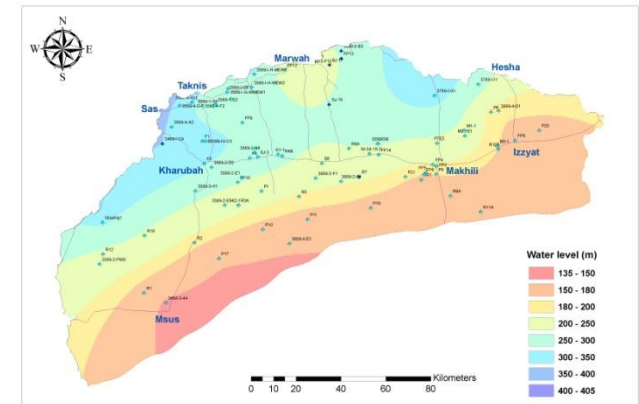
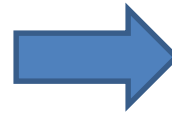
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GWIS Layout

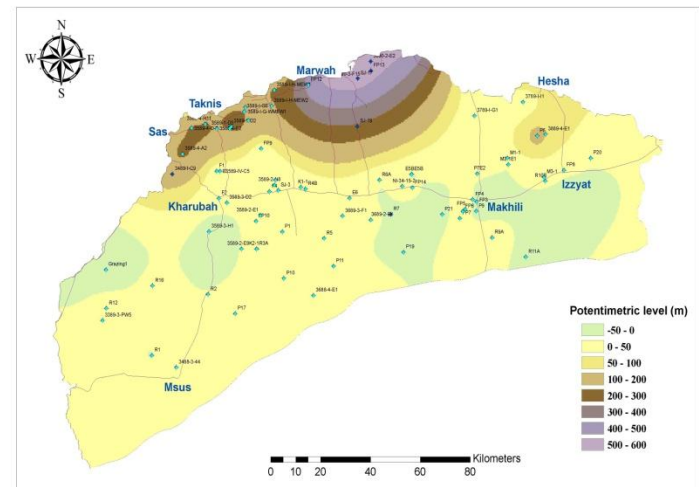
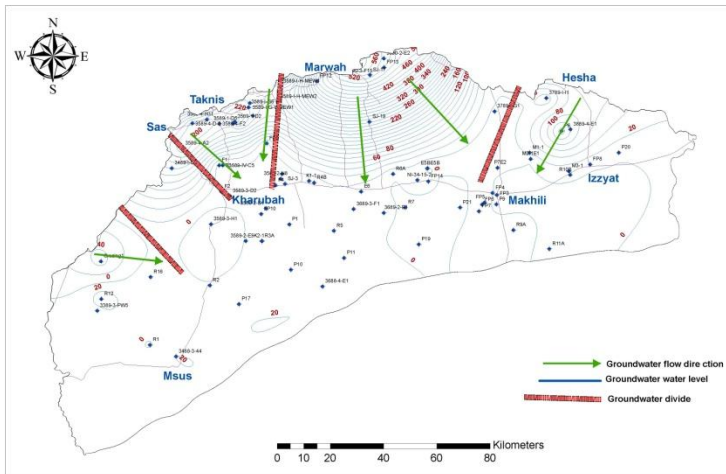


GIS Integration Spatial Analysis

Groundwater level map

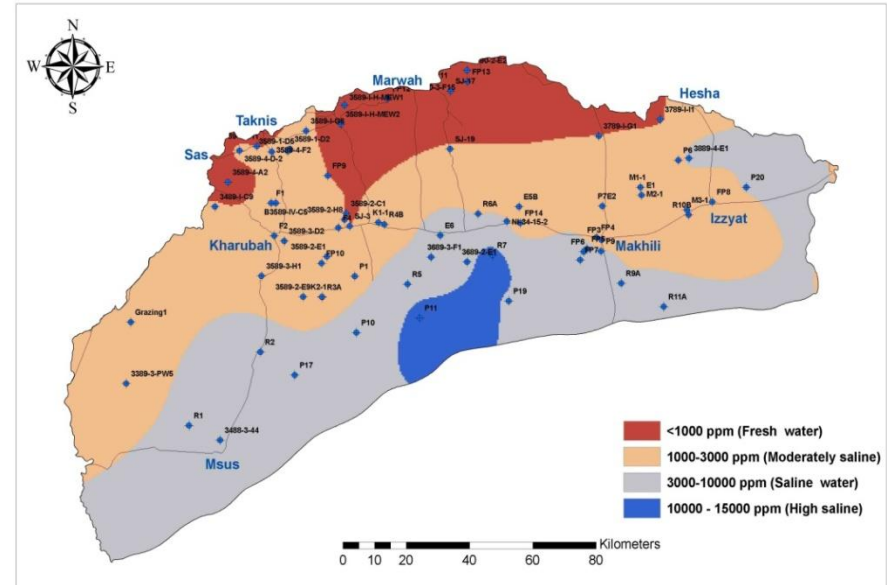
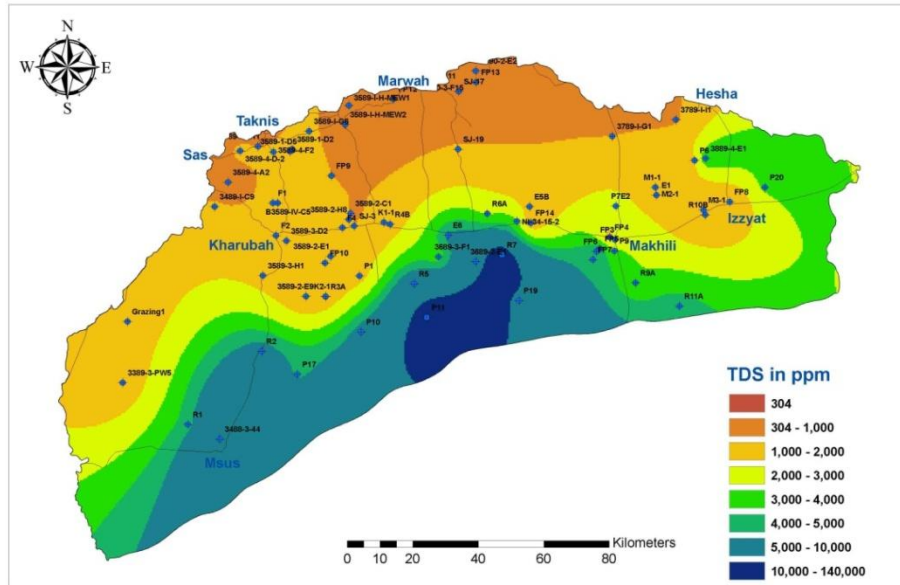


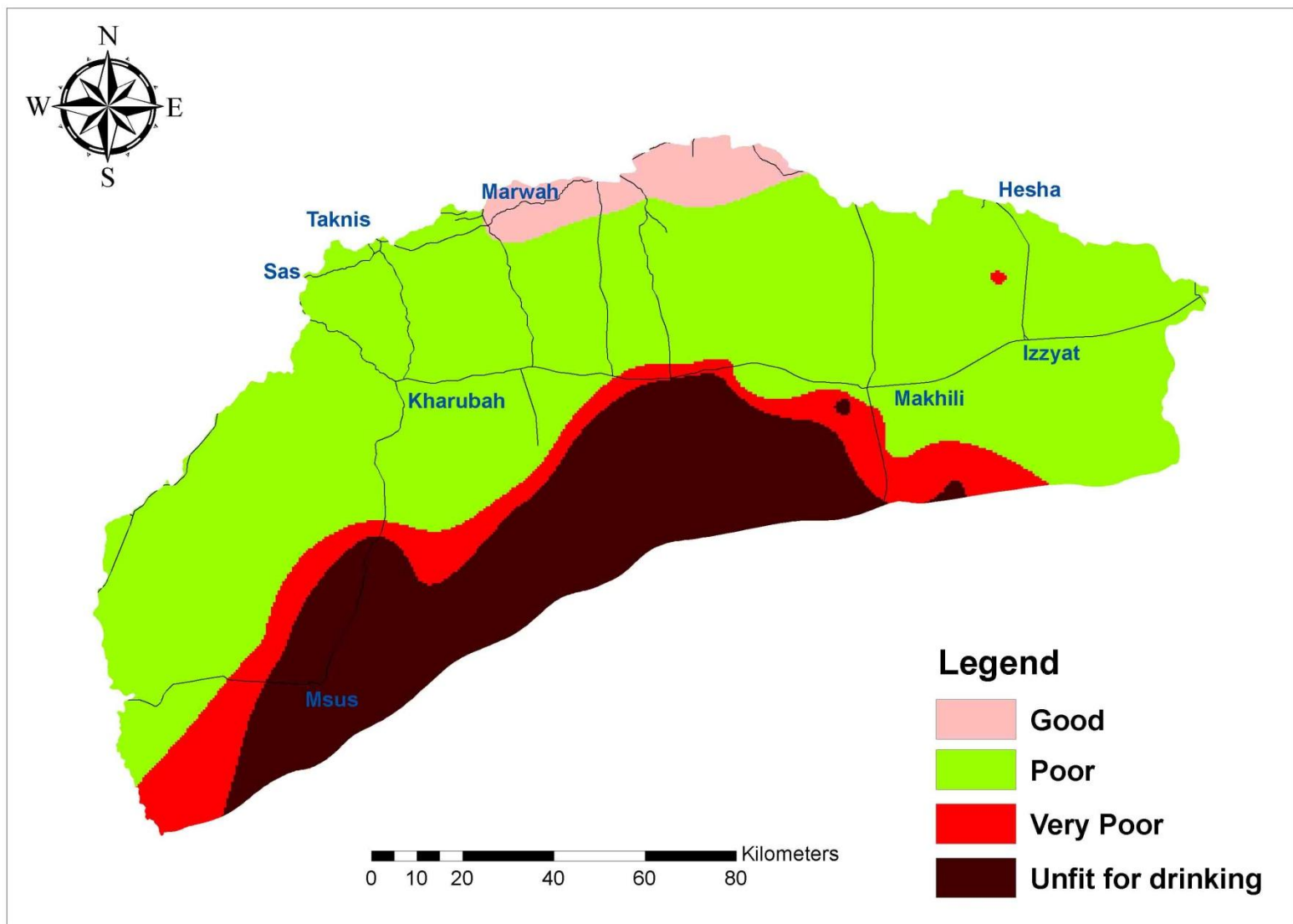
Potentiometric map



GIS Integration Spatial Analysis

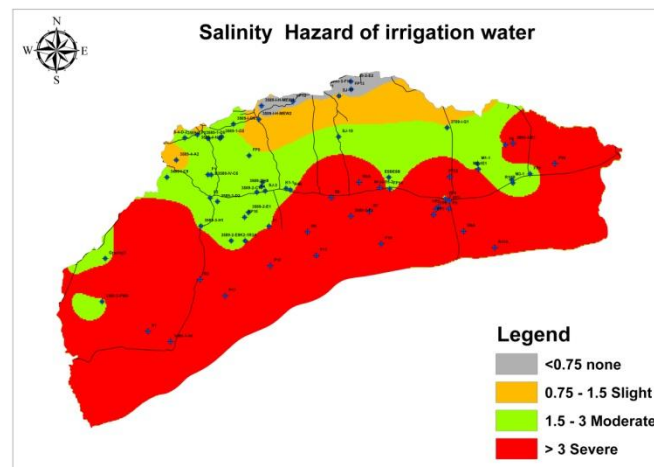
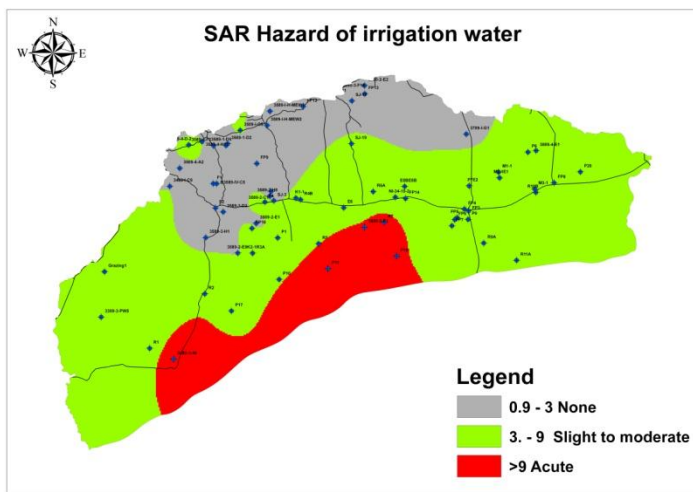
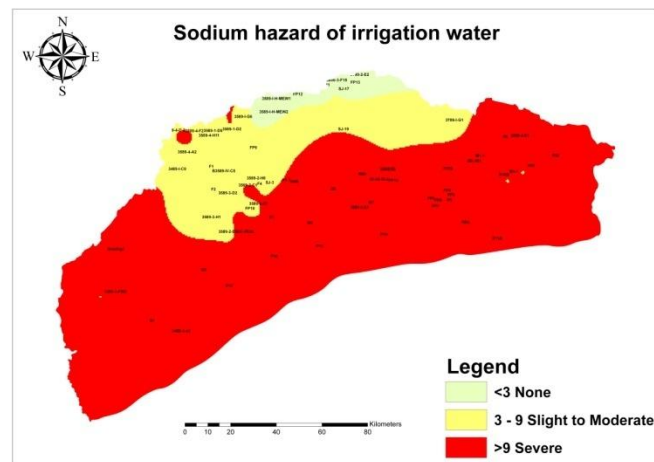
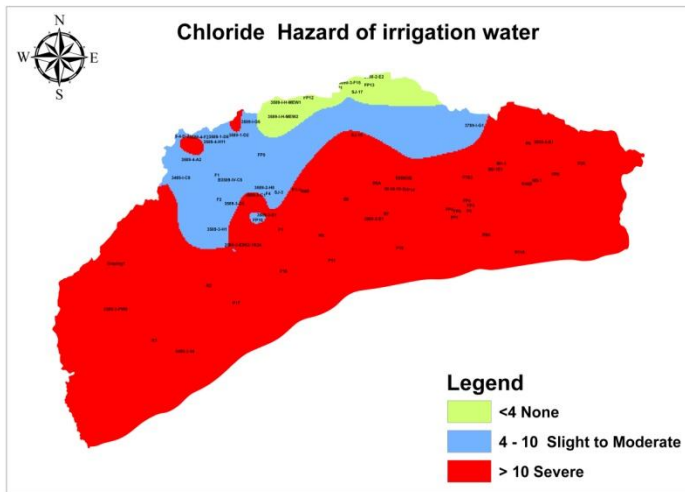
Total dissolved solids map



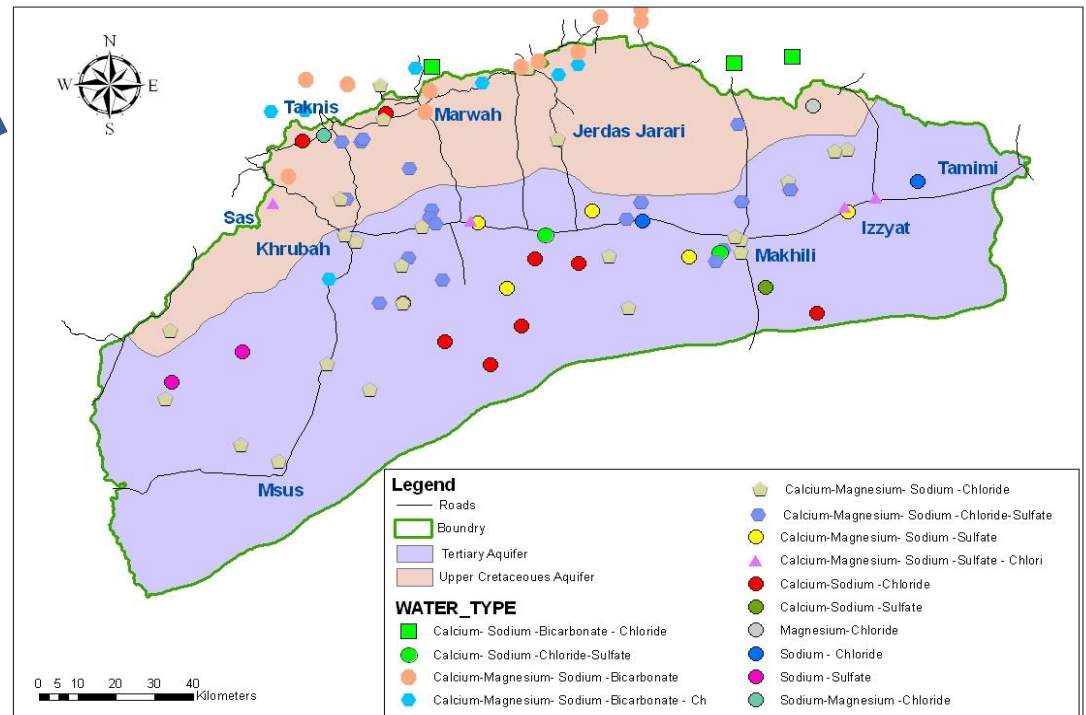
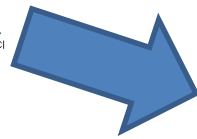
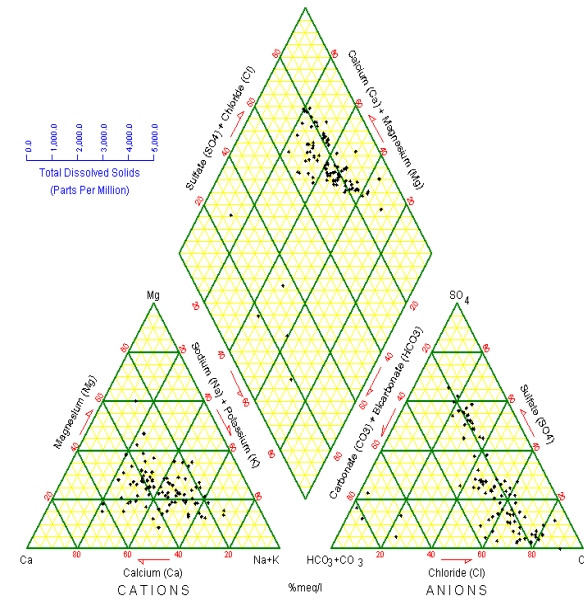


Groundwater quality index for drinking use

GIS DSS Hazards of irrigation water



GIS Integration Mapped water Type



Thank You

