

Aufbau eines Umweltinforma- tionssystems für Kuwait *auf Basis von ArcGIS-Technologien*

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14. Deutschsprachige ESRI Anwenderkonferenz

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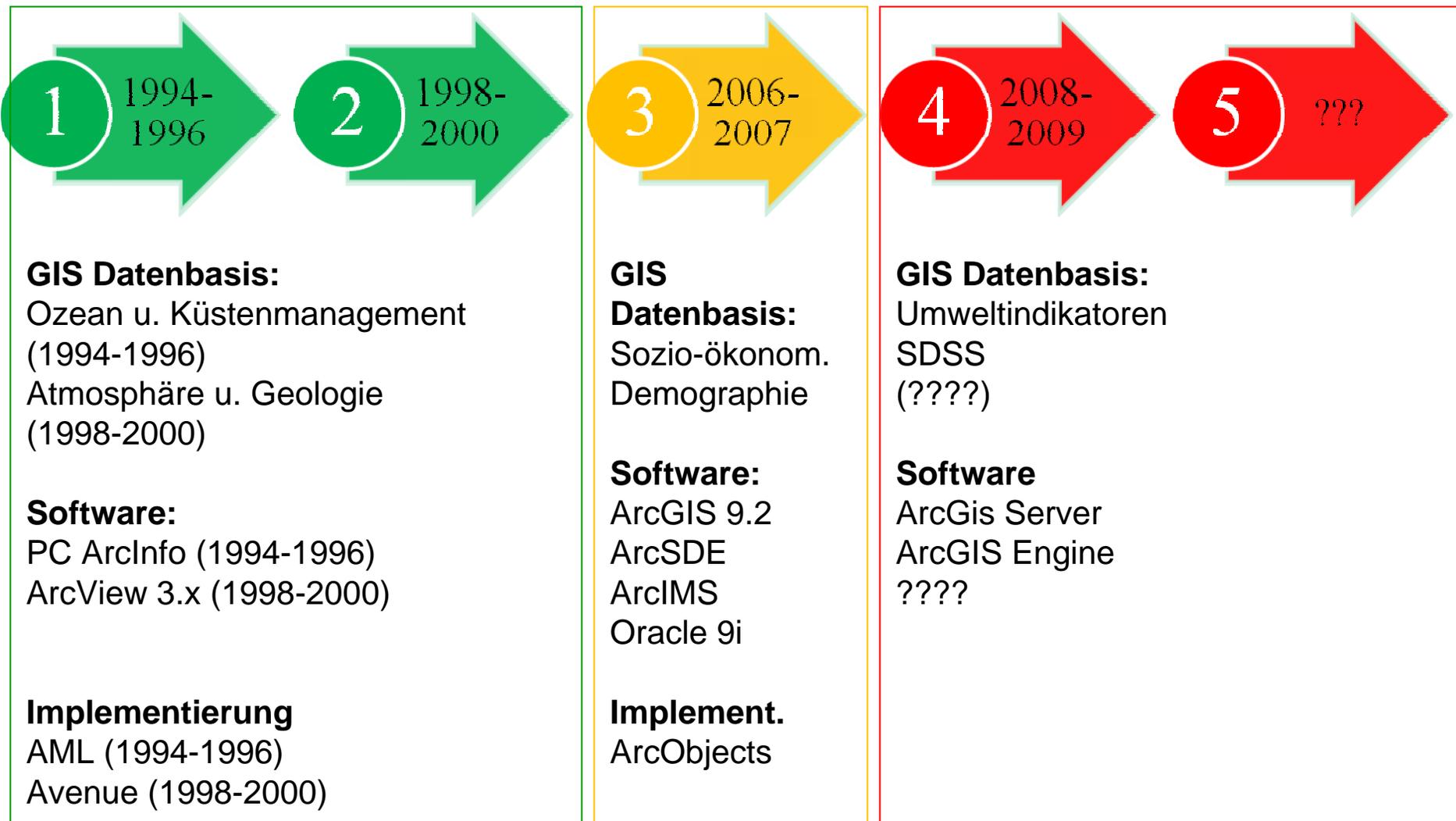
Forum am Deutschen Museum, München



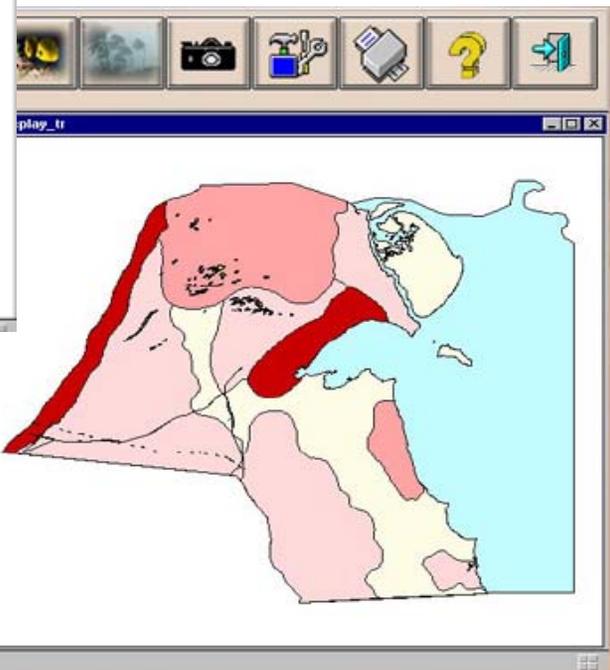
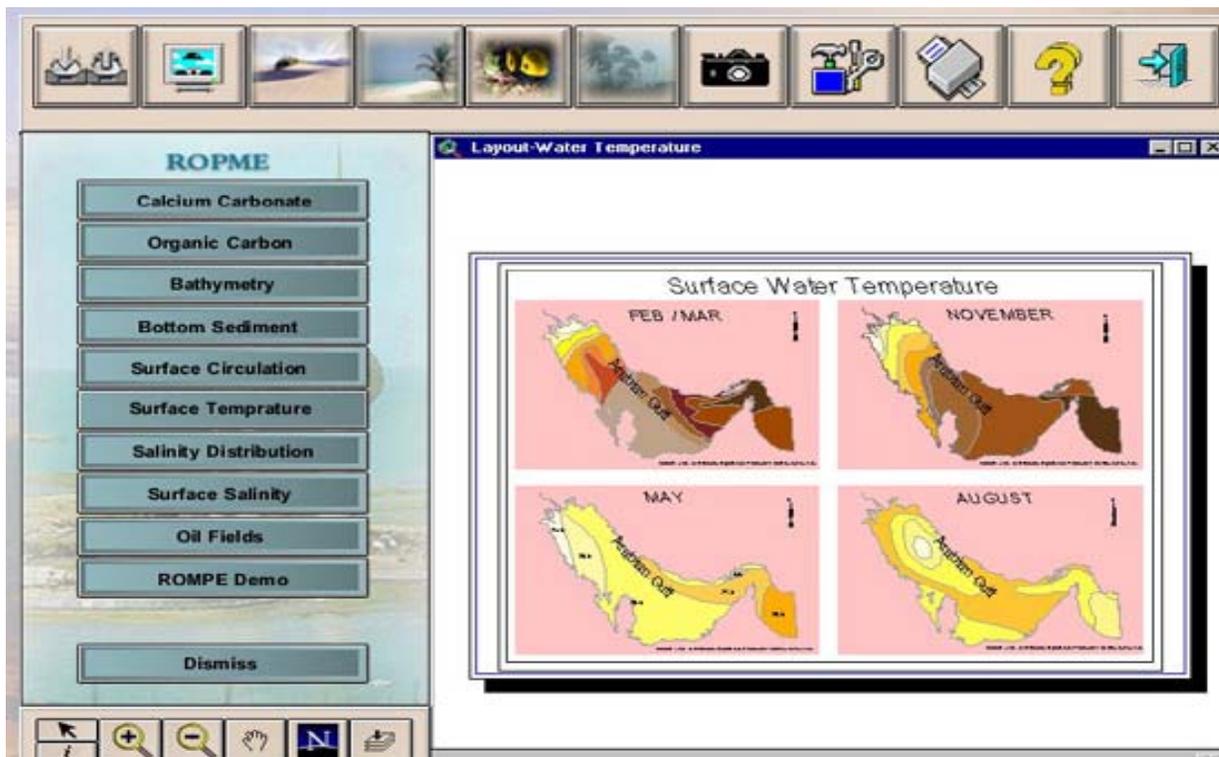
- Ausgangslage (KIEIN-I und KIEIN-II)
- Überblick über KIEIN-III
- Die Einzelmodule
- Die KIEIN-III Datenbasis

Ausgangslage (KIEIN-I und KIEIN-II)

- Bildung eines Netzwerkes zur **Generierung** und **Verbreitung** von **Umweltinformationen** in Kuwait.
- Unterstützung von **Entscheidungsträgern, Planern** und **Wissenschaftlern** durch die Bereitstellung und Analyse raumbezogener Umweltinformationen.
- **Weiterbildung** in den Bereichen **GIS Technologien** und **Umweltwissenschaften**



KIEIN-II ArcView Applikation



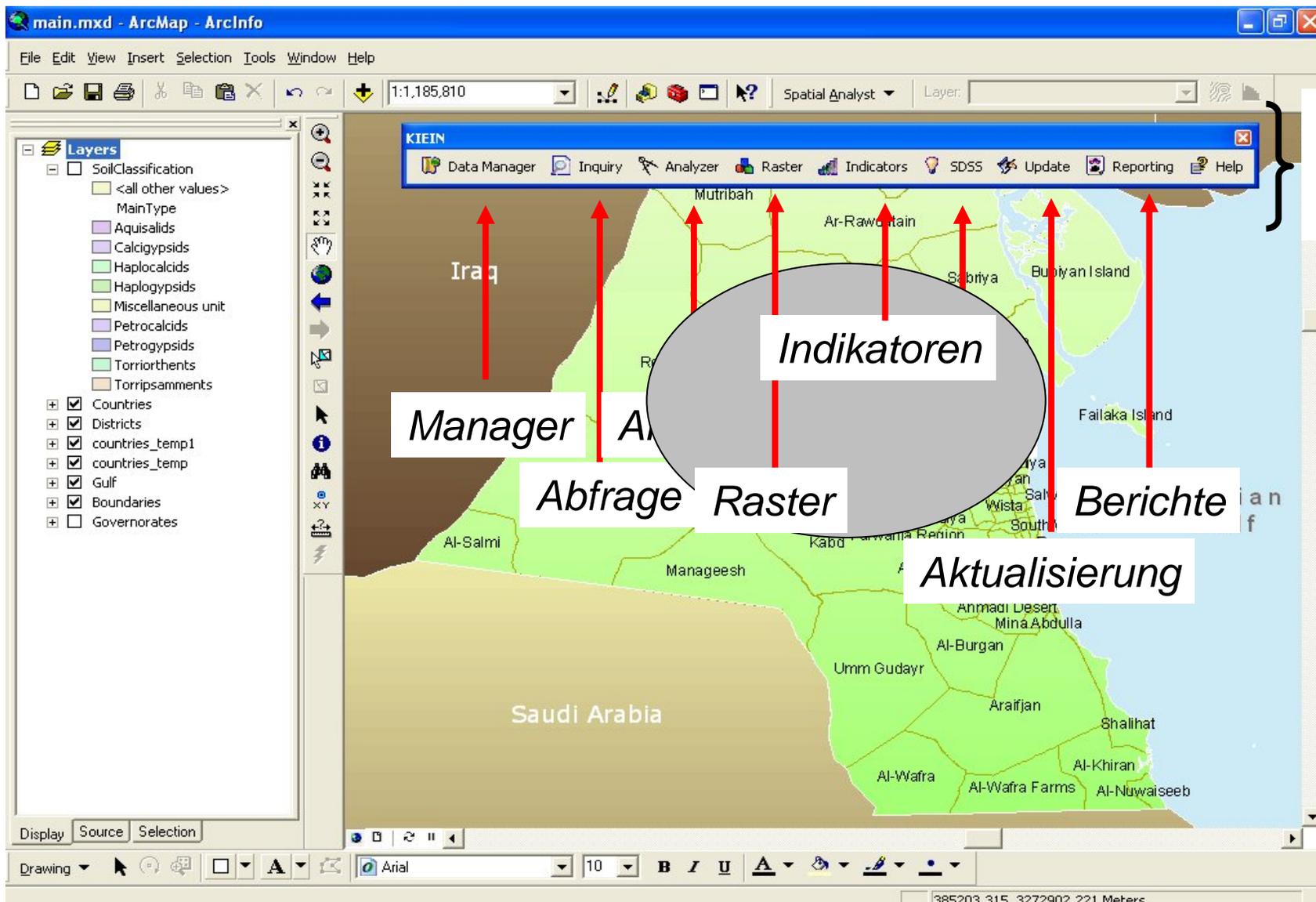
KI EIN-III Überblick

- **Kuwait Integrated Environmental Information Network (KIEIN)**
- **Kuwait Institute for Scientific Research (KISR)**
- Finanziert durch **UNDP**-Kuwait
- **Projektkonsortium Phase III:**
 - **Kuwait GIS**, Kuwait: lokaler Partner, Projektkoordination
 - **GISCON Solutions**, BRD: GIS, Planung, Design, Qualitätskontrolle
 - **Icon Technologies**, Ägypten: Implementierung, Programmierung, Training



- **Migration** existierender Daten nach KIEIN-III
- Integration neuer **sozio-ökonomischer Daten** in KIEIN-III
- Entwicklung neuer **GIS Desktop Anwendungen**
- Entwicklung von **Web-basierten GIS Anwendungen**
- **Weiterbildung** KISR Mitarbeiter

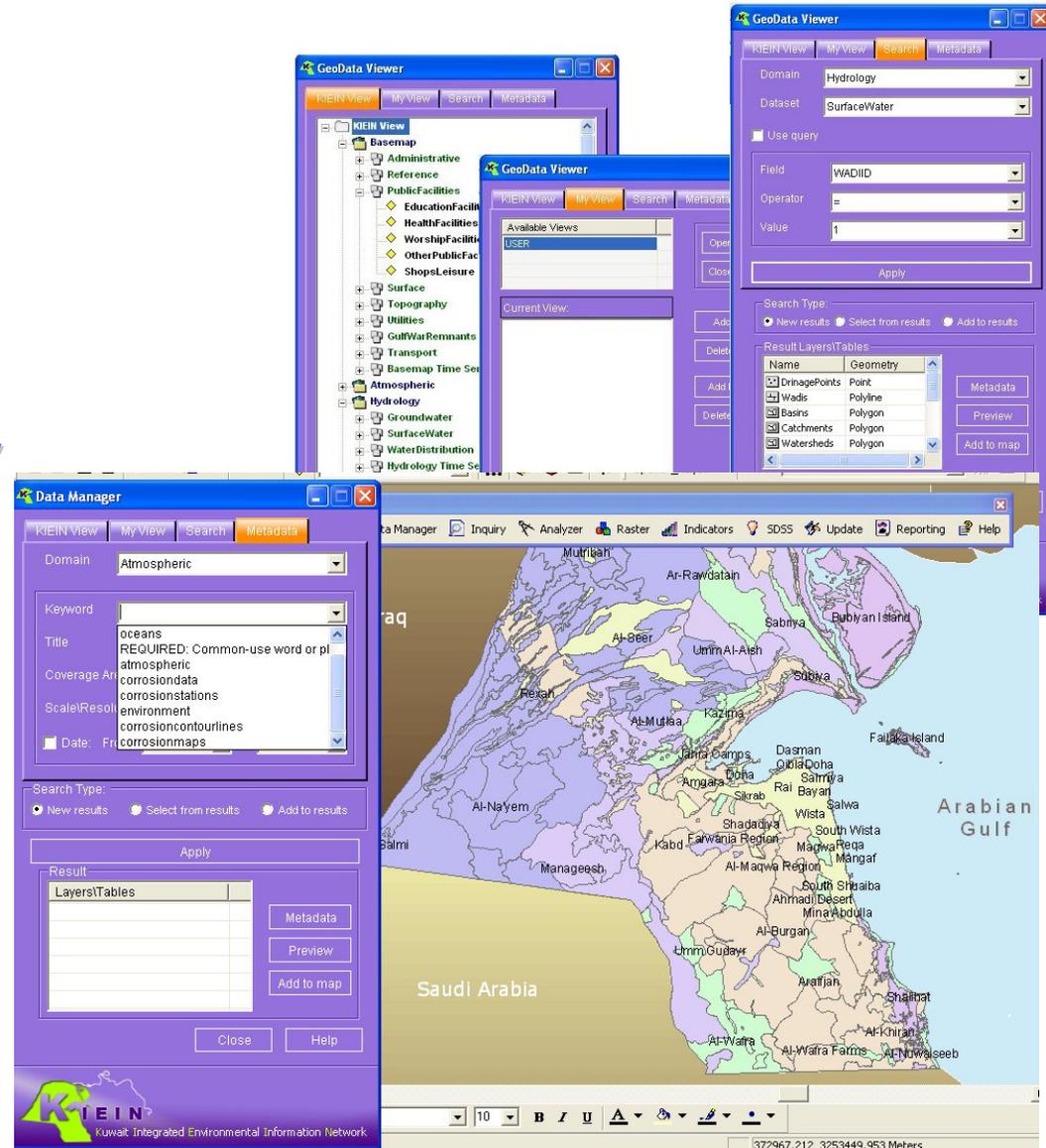
KIEIN-III GIS Desktop Modul



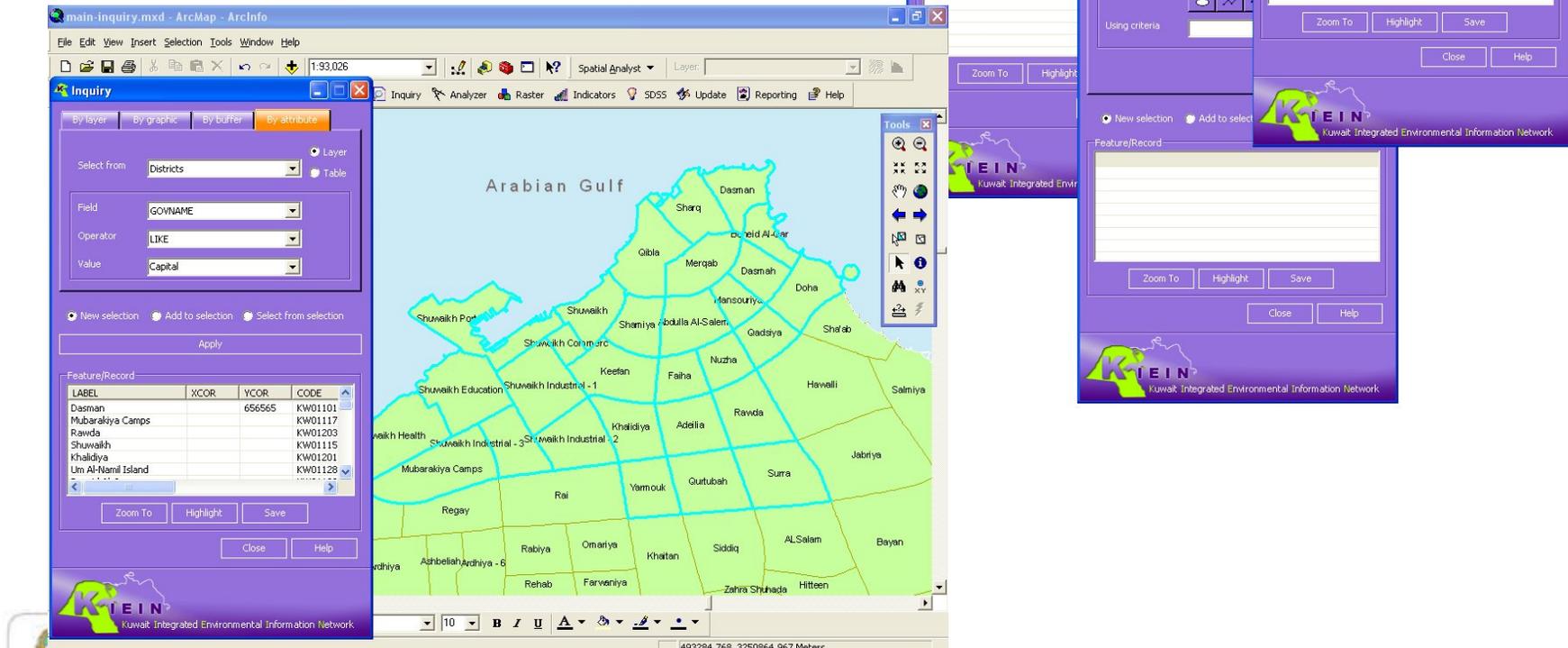
KIEIN
Toolbar
ArcMap

Die Einzelmodule

- **Verwaltung** KIEIN-III Geodatabase
- **Manipulation** von Layer
- **Erzeugung** neuer **Layer**
- **Kopieren/Löschen** etc.
- **Benutzerkonten**
- **Metadaten**



- Abfrage nach **Attributen**
- Abfrage nach **Lagekriterien**
- **Erzeugung** von **Teilmengen**



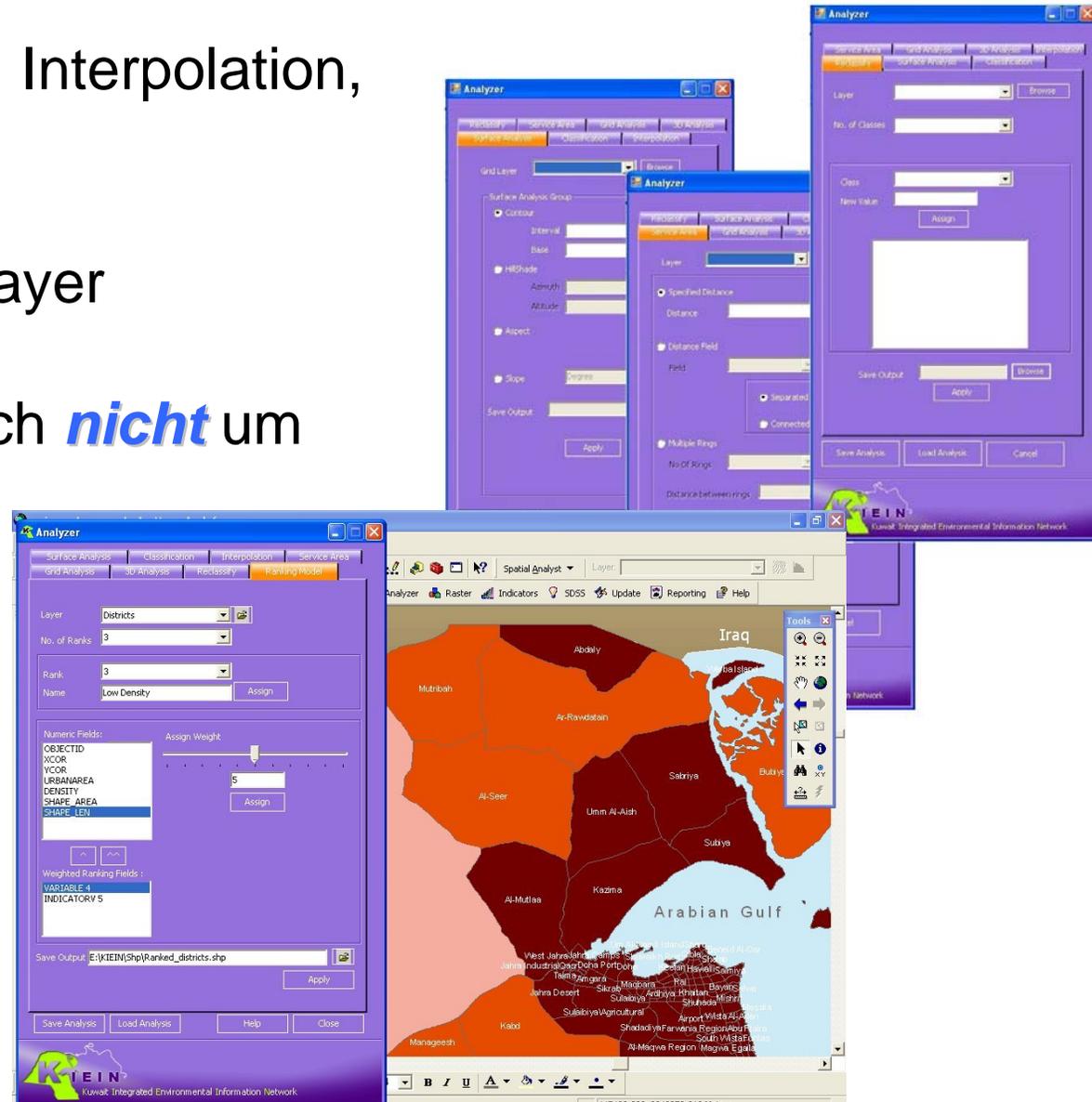
The screenshot displays the ArcMap Inquiry tool interface. The main window shows a map of Kuwait with various districts highlighted in green. The Inquiry tool is open, showing several dialog boxes for different search methods:

- Search by attribute:** Select from: Districts, Field: GOVNAME, Operator: LIKE, Value: Capital.
- Search by buffer:** Select from layer: SDE.SeaWaterQuality_SDE.Sea, Using distance: 1000 m, Dissolve: Dissolve.
- Search by graphic:** Select from layer: SDE.SeaWaterQuality_SDE.Sea, Using criteria: [empty].
- Search by layer:** Select from layer: SDE.SeaWaterQuality_SDE.Sea, Using criteria: [empty].

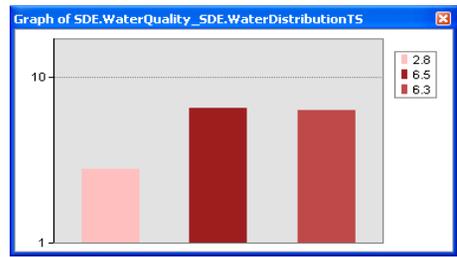
The main map window shows the following table of data:

LABEL	XCOR	YCOR	CODE
Dasman		656565	KW01101
Mubarakiya Camps			KW01117
Rawda			KW01203
Shuwaikh			KW01115
Khalidiya			KW01201
Um Al-Nami Island			KW01128

- **Geoprocessing** (3D, Interpolation, Buffer etc.)
- **Erzeugung neuer Layer**
- **Benutzer** braucht sich **nicht** um **Datenbank** kümmern



- **Gewichtung** von **Umweltindikatoren**
- **Ranking**
- **Visualisierung** der **Rankings (Diagramme)**
- **Zeitreihenanalysen**



Time series

Phosphates 1/1/1996

1/1/1996 12/1/1998

Play

Interpolate

IDW Interval (sec) 3 Classification

Sensitivity

	BF	RF	ICF	VI	RSI	Rank
Concrete sea wall and harbor structure	5	0	0	10		
Beach rock outcrop	4	0	0	9		
Fine sand beach	3	0	0	8		
Medium to coarse sand beach	4	1	9	7		
Hard sand mud tidal flat (low productivity)	1	5	8	3		

Biodiversity information

Selected Features

- MarineSpeciesObservations
- Fisheries
 - 1
 - 2
 - 3
 - 4
 - 5

Information

NEAR SHORE FISH

SPECIES

- Ilisha spp.
- Sardinella spp.
- Allanetta forskali
- Platycephalus indicus
- Epinephelus tauvina (I)

S4 << >>

Close

Time series

I want to know (1,2,4-trimethylbenzene) for:

Feature Value Time

With following parameters:

Min

Max

10

10

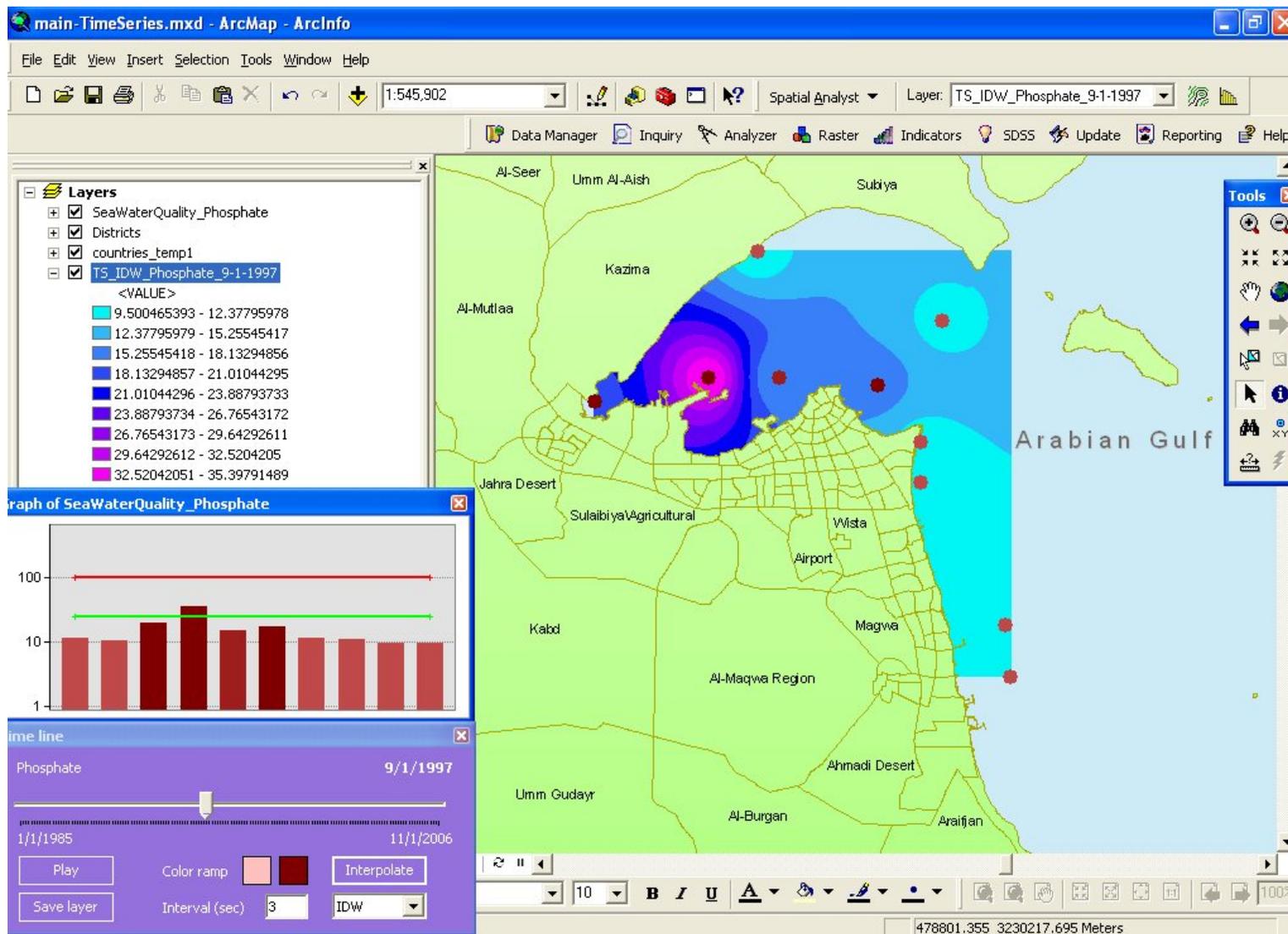
Find Timeline...

Back Close Help

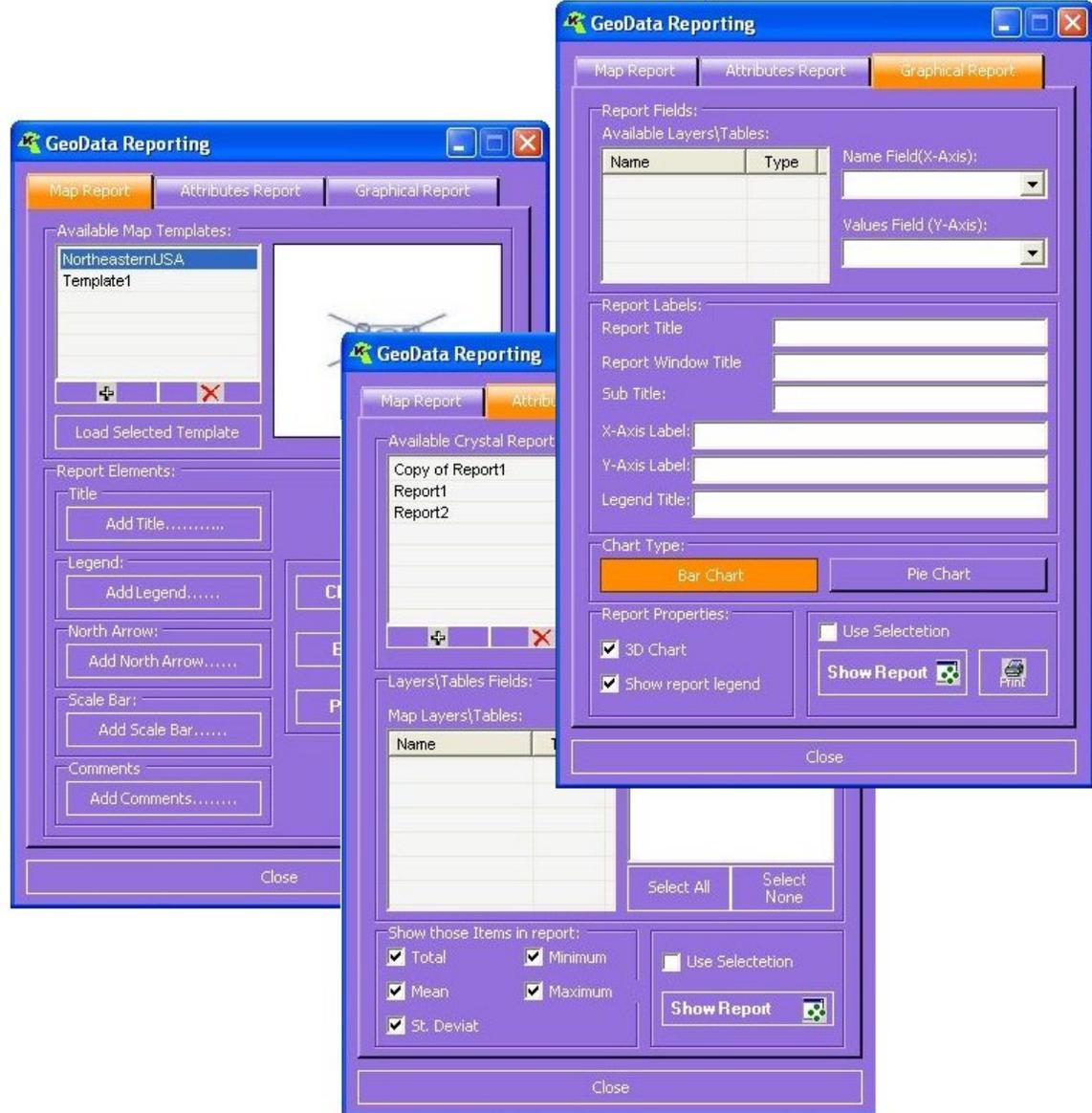
Info Close

Information Network

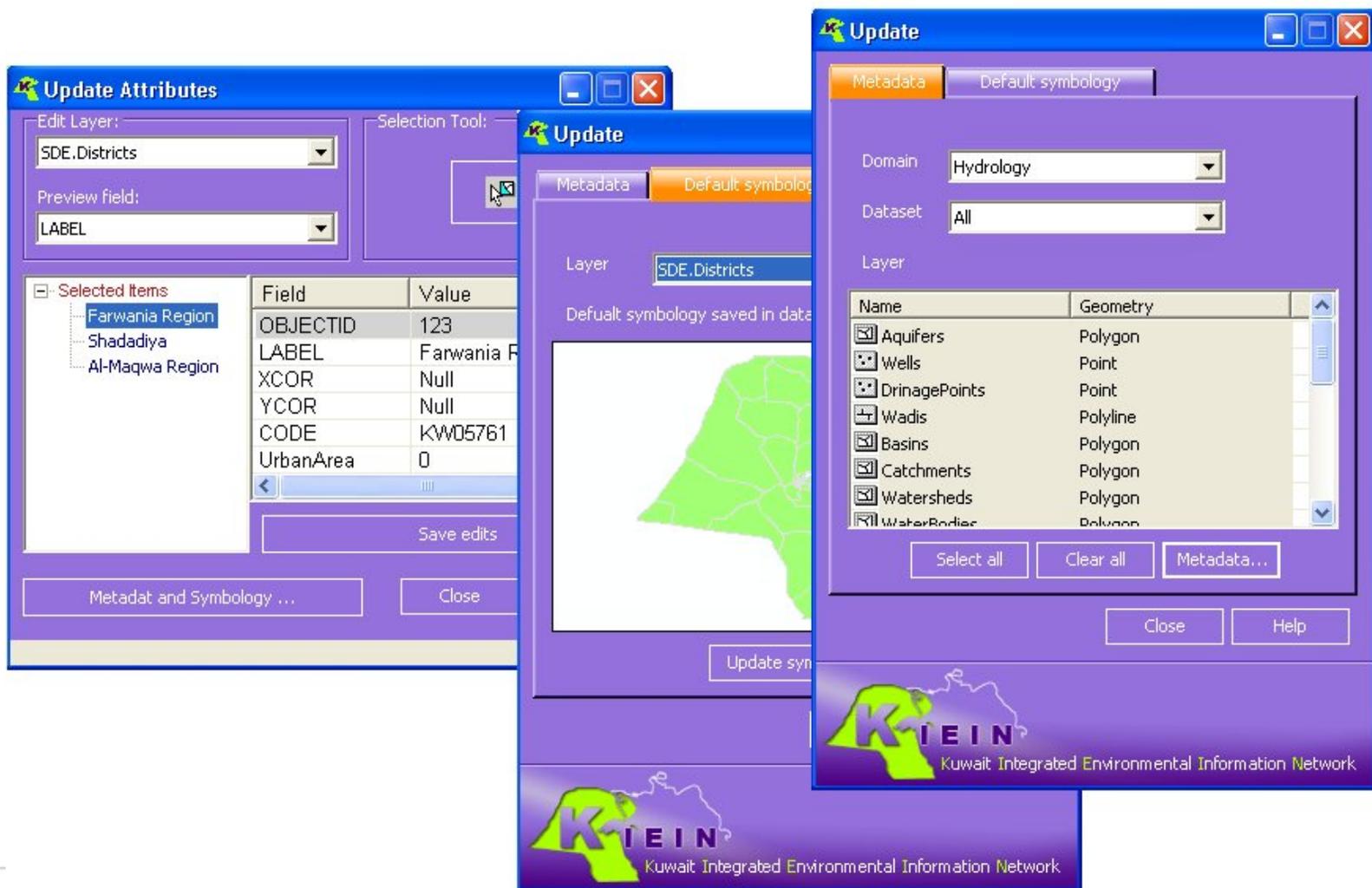
Integrated Environmental Information Network



- Erzeugung von **Karten**
- Erzeugung von **Diagrammen**
- Erzeugung von **tab. Übersichten**



■ Aktualisierung von *Attributen* in Tabellen und Layer



Update Attributes

Edit Layer: SDE.Districts

Selection Tool:

Preview field: LABEL

Selected Items:

- Farwania Region
- Shadadiya
- Al-Maqwa Region

Field	Value
OBJECTID	123
LABEL	Farwania R
XCOR	Null
YCOR	Null
CODE	KW05761
UrbanArea	0

Save edits

Metadat and Symbology ...

Close

Update

Metadata Default symbology

Layer: SDE.Districts

Default symbology saved in data

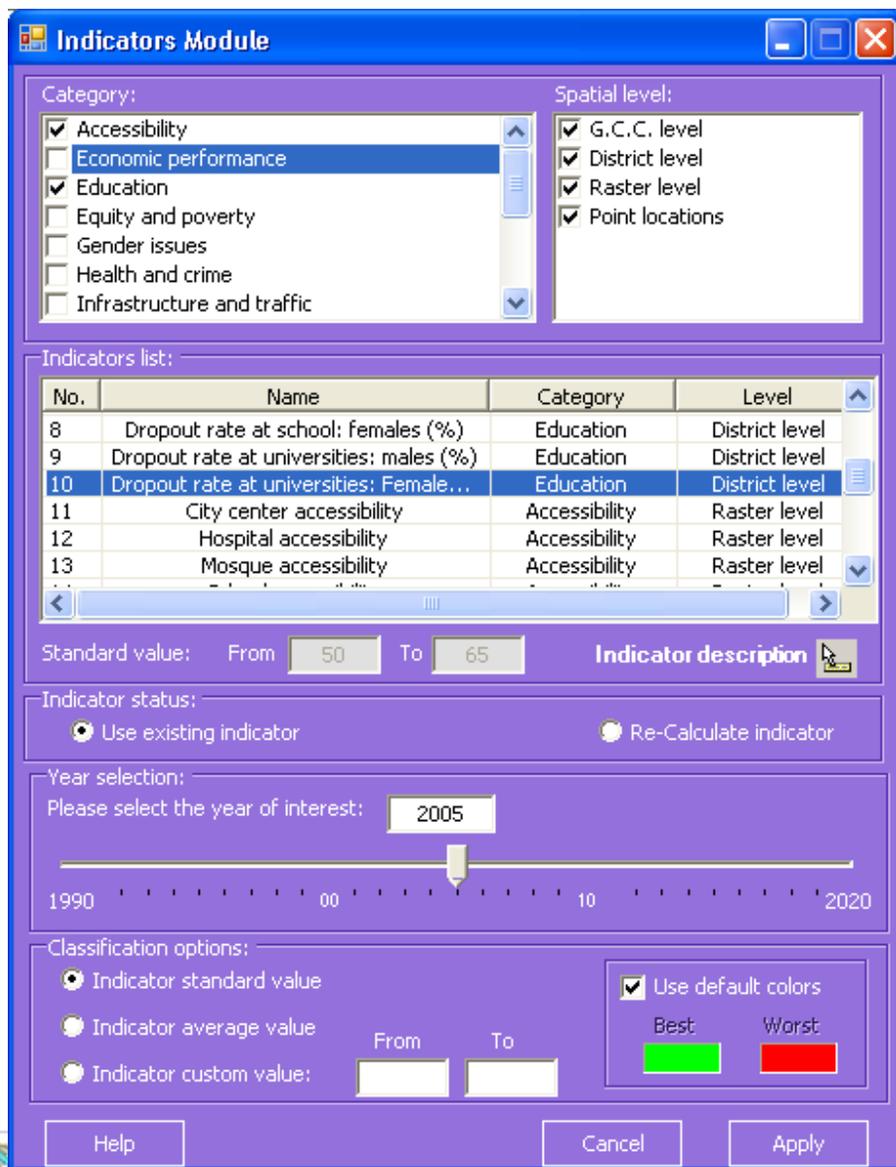
Name	Geometry
<input checked="" type="checkbox"/> Aquifers	Polygon
<input checked="" type="checkbox"/> Wells	Point
<input checked="" type="checkbox"/> DrainagePoints	Point
<input checked="" type="checkbox"/> Wadis	Polyline
<input checked="" type="checkbox"/> Basins	Polygon
<input checked="" type="checkbox"/> Catchments	Polygon
<input checked="" type="checkbox"/> Watersheds	Polygon
<input checked="" type="checkbox"/> WaterBodies	Polygon

Select all Clear all Metadata...

Close Help

KIEIN
Kuwait Integrated Environmental Information Network

- Visualisierung von **Indikatoren**, nicht von **Daten**
- **Berechnung** der Indikatoren **on-the-fly**
- Automatische **Erzeugung** von Karten/Layern und Ergänzung derselben im TOC
- **Sammlung** und **Kombination** der notwendigen Daten u. Layer aus unterschiedlichen **SQL-Tabellen** und **Domains**
- **Benutzer wählt** Indikator, Jahr, Ebene, Klassifikation, Farben
- Benutzer sollte sich jedoch **nicht** um die zu Grunde liegende **Datenbasis kümmern** müssen



The screenshot shows the 'Indicators Module' window with the following sections:

- Category:** A list of categories with checkboxes. 'Accessibility' is checked. 'Economic performance' is selected in the list.
- Spatial level:** A list of spatial levels with checkboxes. 'G.C.C. level', 'District level', 'Raster level', and 'Point locations' are all checked.
- Indicators list:** A table with columns 'No.', 'Name', 'Category', and 'Level'. Row 10 is selected.
- Standard value:** 'From' 50, 'To' 65.
- Indicator status:** 'Use existing indicator' is selected.
- Year selection:** 'Please select the year of interest: 2005'. A slider below shows the range from 1990 to 2020.
- Classification options:** 'Indicator standard value' is selected. 'Use default colors' is checked. A color legend shows 'Best' in green and 'Worst' in red.

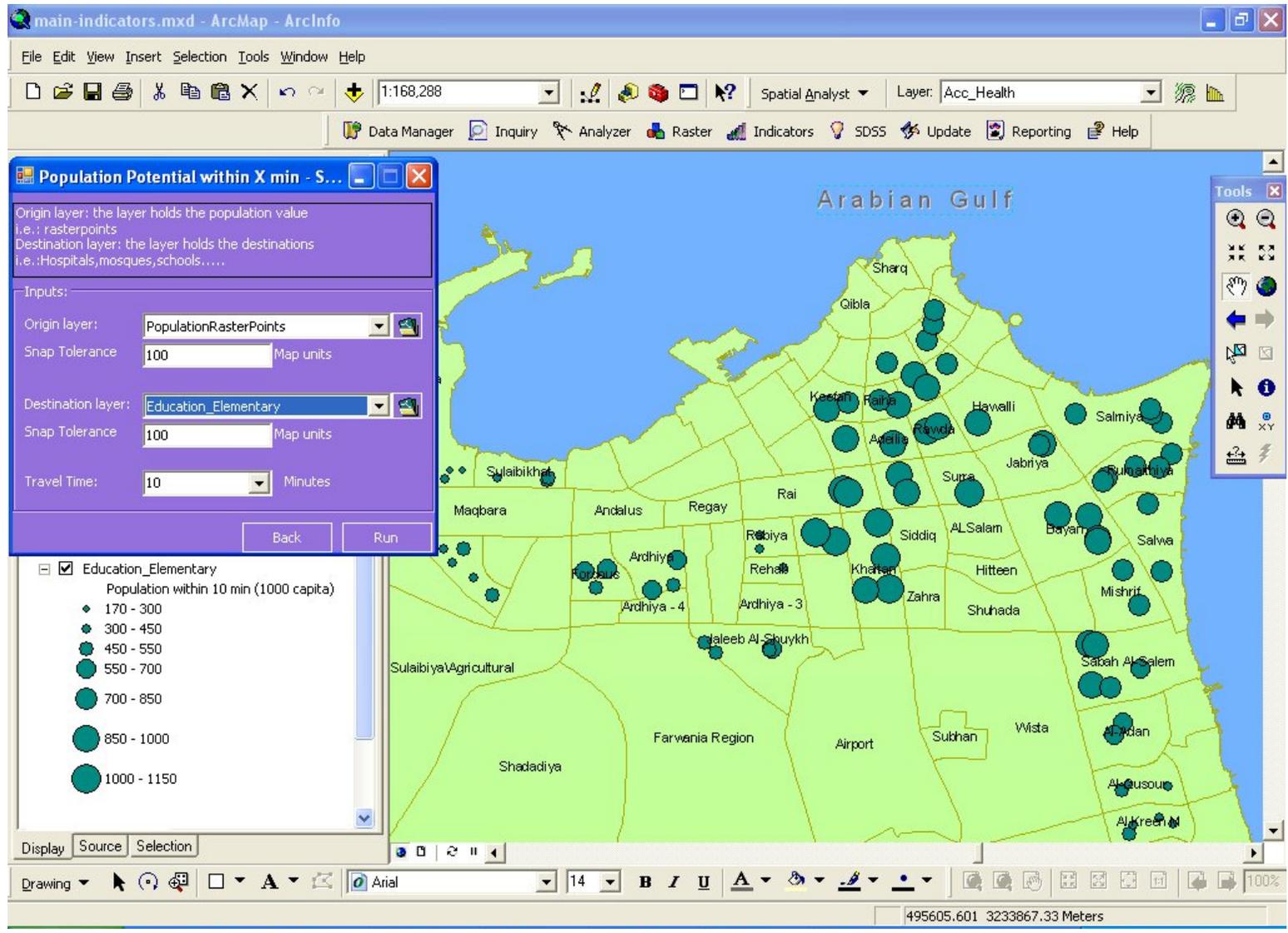
Buttons at the bottom: Help, Cancel, Apply.

Indikatorauswahl

Auswahl Jahr

Kartenlayout

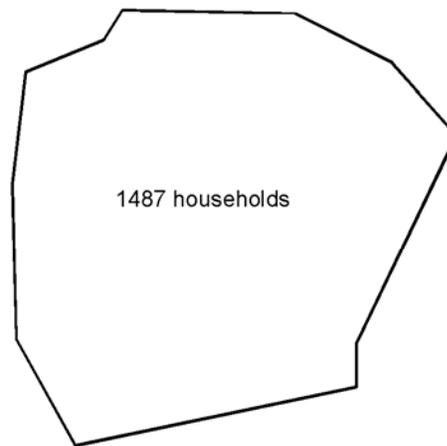
Modul 7. Indikatorenmodul - Indicators (III)



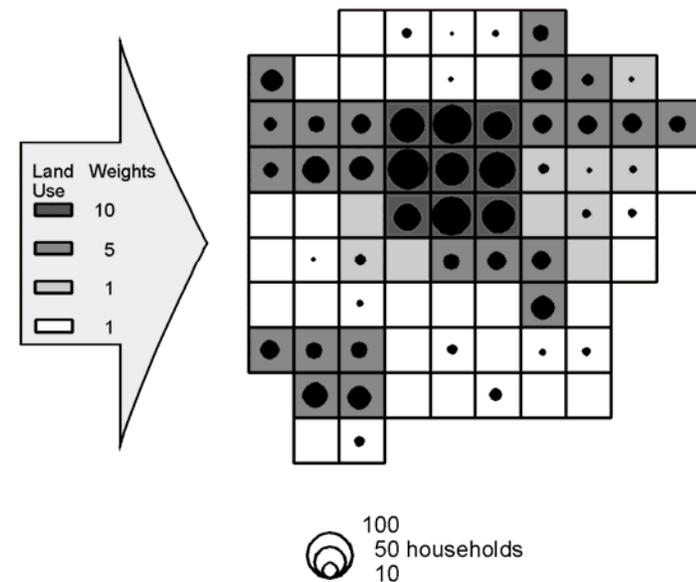
- Zunehmende **Notwendigkeit** räuml. **disaggregierter** Daten
- Generierung **neuer Erkenntnisse** über **räuml. Prozesse**
- **Verbesserung** räuml. **Datenbasen** (Planung/Forschung)
- Raster: Schnittstelle zwischen **sozio-ökon. Statistiken** und **Umweltmodellen**
- Raster: Schnittstelle zwischen **Flächennutzungs-/Verkehrsmodellen** und **Umweltmodellen**
- Räuml. **disaggregierte Daten nicht verfügbar** in Statistiken

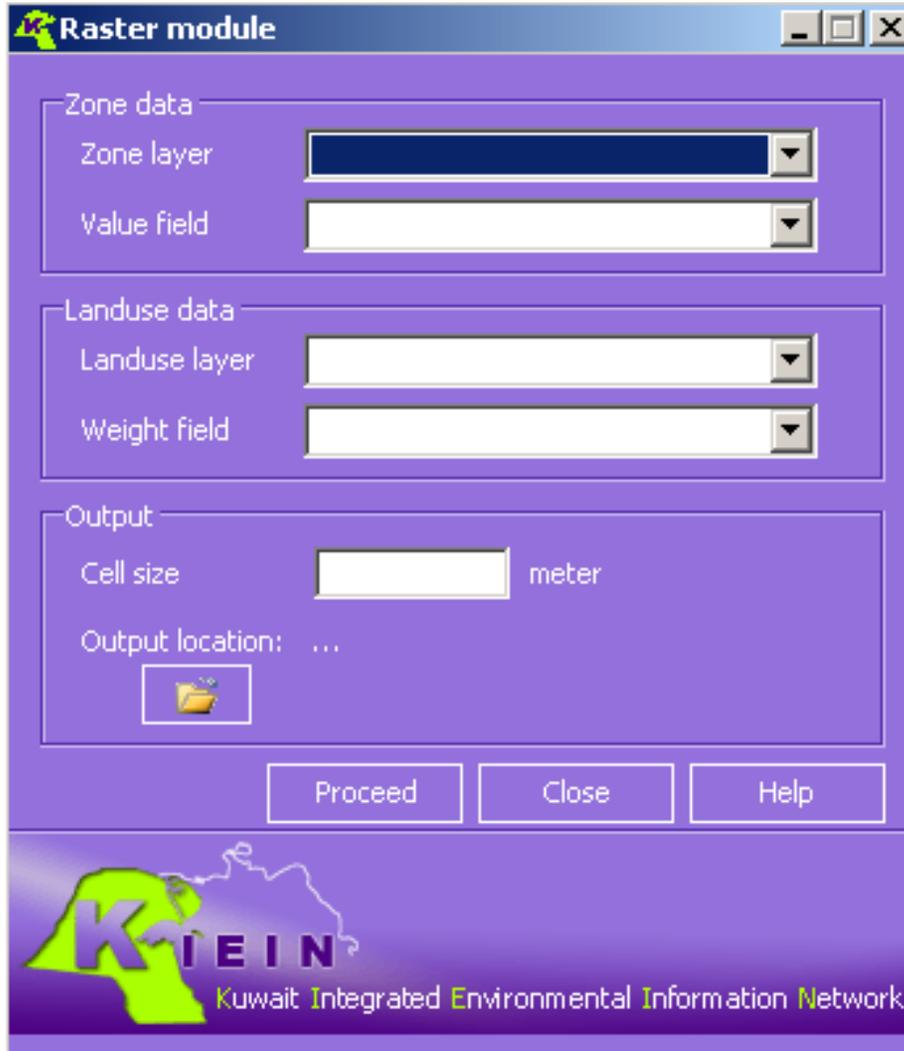
- Schritt 1: **Rasterisierung** der **Flächennutzung** und **Grenzen**
- Schritt 2: **Bestimmung** von **Wahrscheinlichkeiten**
- Schritt 3: **Disaggregation** von **Zonendaten** zu **Mikrodaten**
(Distrikt -> Raster)

Zonal population data



Raster representation of population





Sozio-ökonom. Indikator

Flächennutzung u. Gewichte

*Informationen zur
Generierung des
Rastersystems*

Landuse Weights

Please assign/change weights to the different land use classes:

- Range of weight is between 1-10.
- Only integer numbers are allowed.

Weights for :

Class	Weight
Air Lines	05
Air Port	08
Bank	08
Church	03
Cinema	07
Co-op	07
College	07
Commercial Complexes (shops ...	06
Embassy	04
Entertainment centre	04
Fire station	05
Fish-fruit-vegetable market	04
Governmental building	08
Green area	08
Hospital	08
Hotel	07
Industrial	10
Kindergarten	04
Land Mark	00
Library	03
Mosque	03
Newspaper	06
Other	00
Park-Area	03
Pharmacy	02

<<< Back to main window

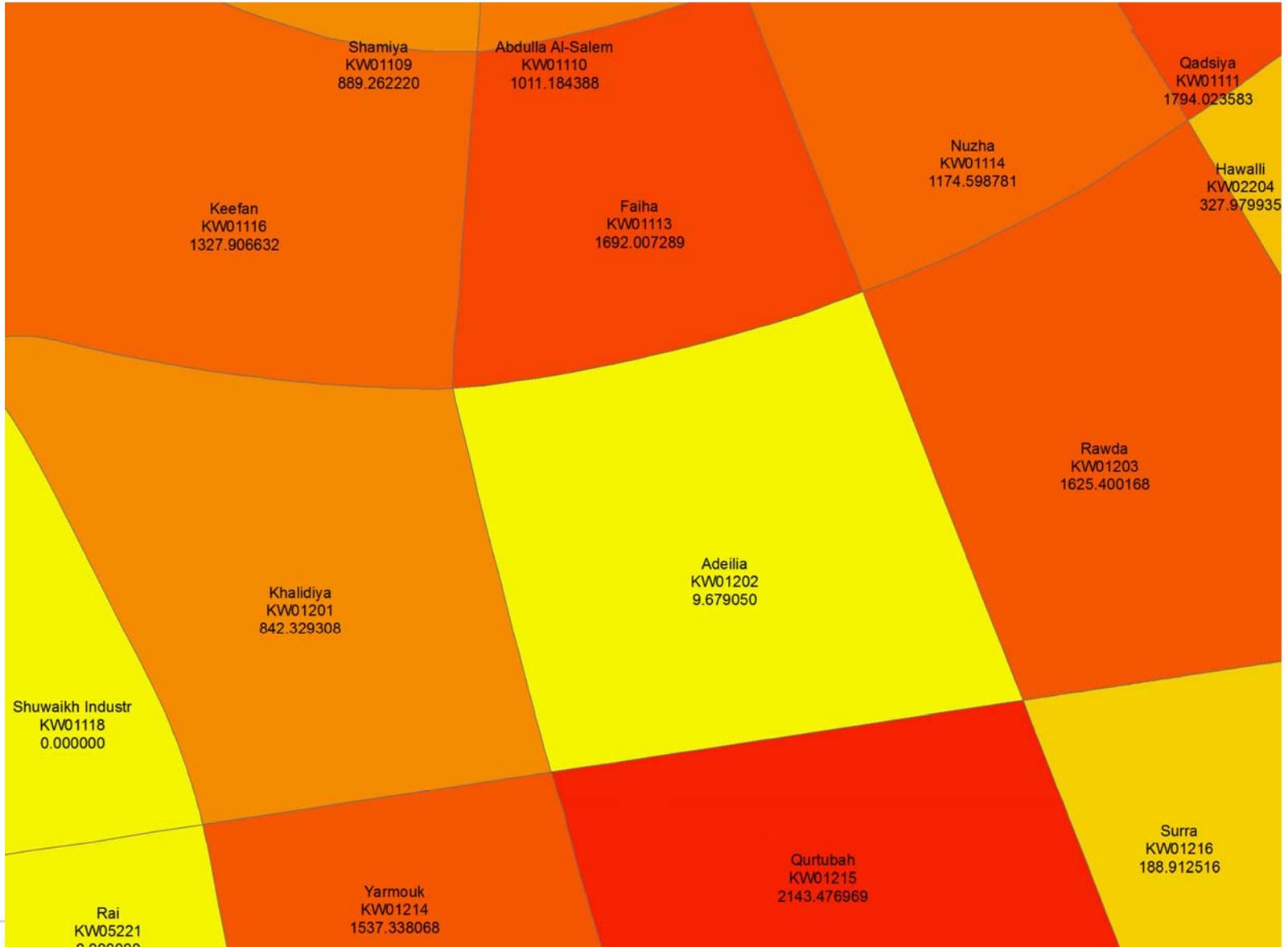
Flächennutzungskategorien

Gewicht (1-10)

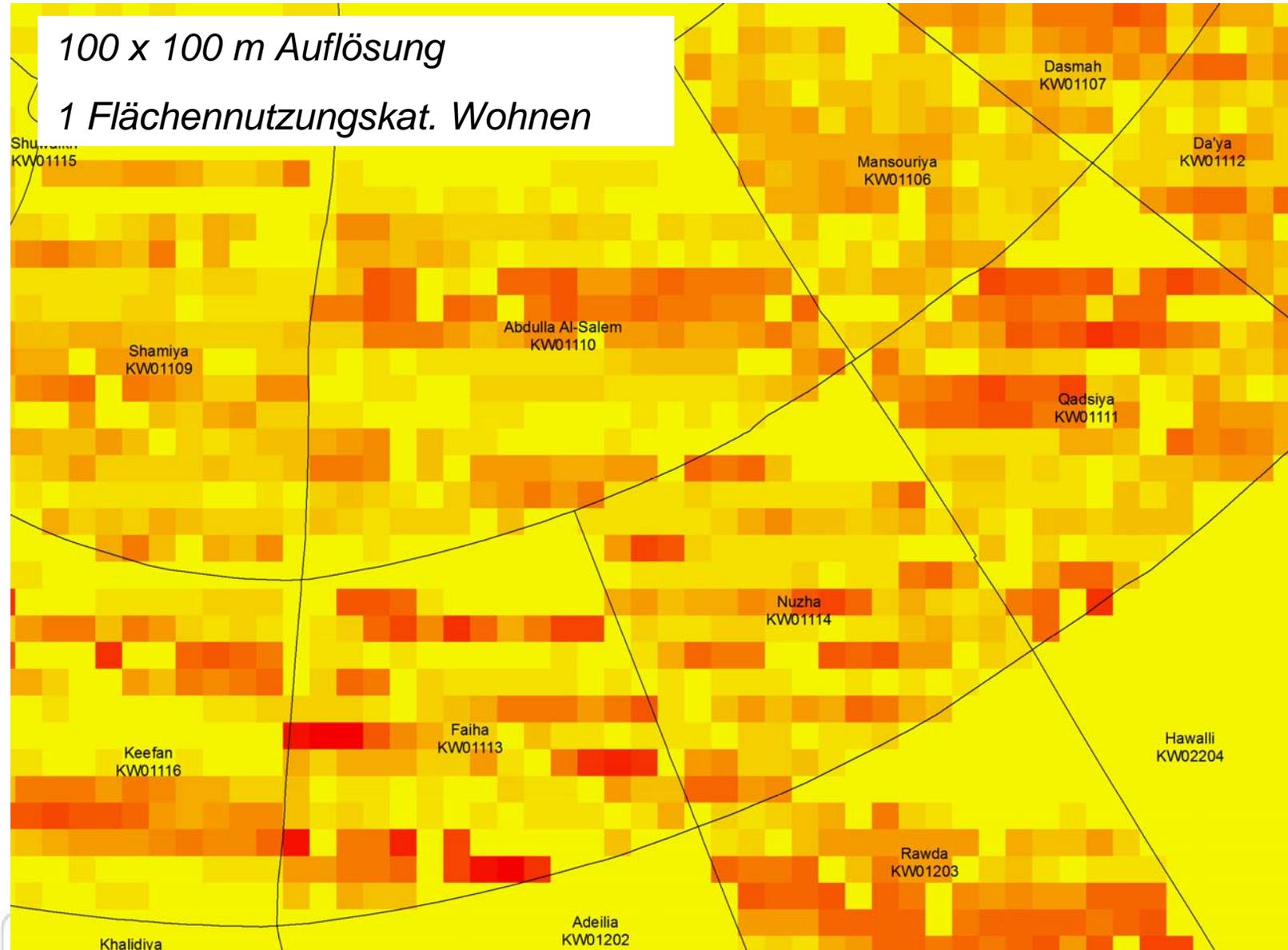
Gewichtungstabelle

Module 8. Raster (V) Beispiel

Traditioneller Ansatz: klass. Dichtekarte



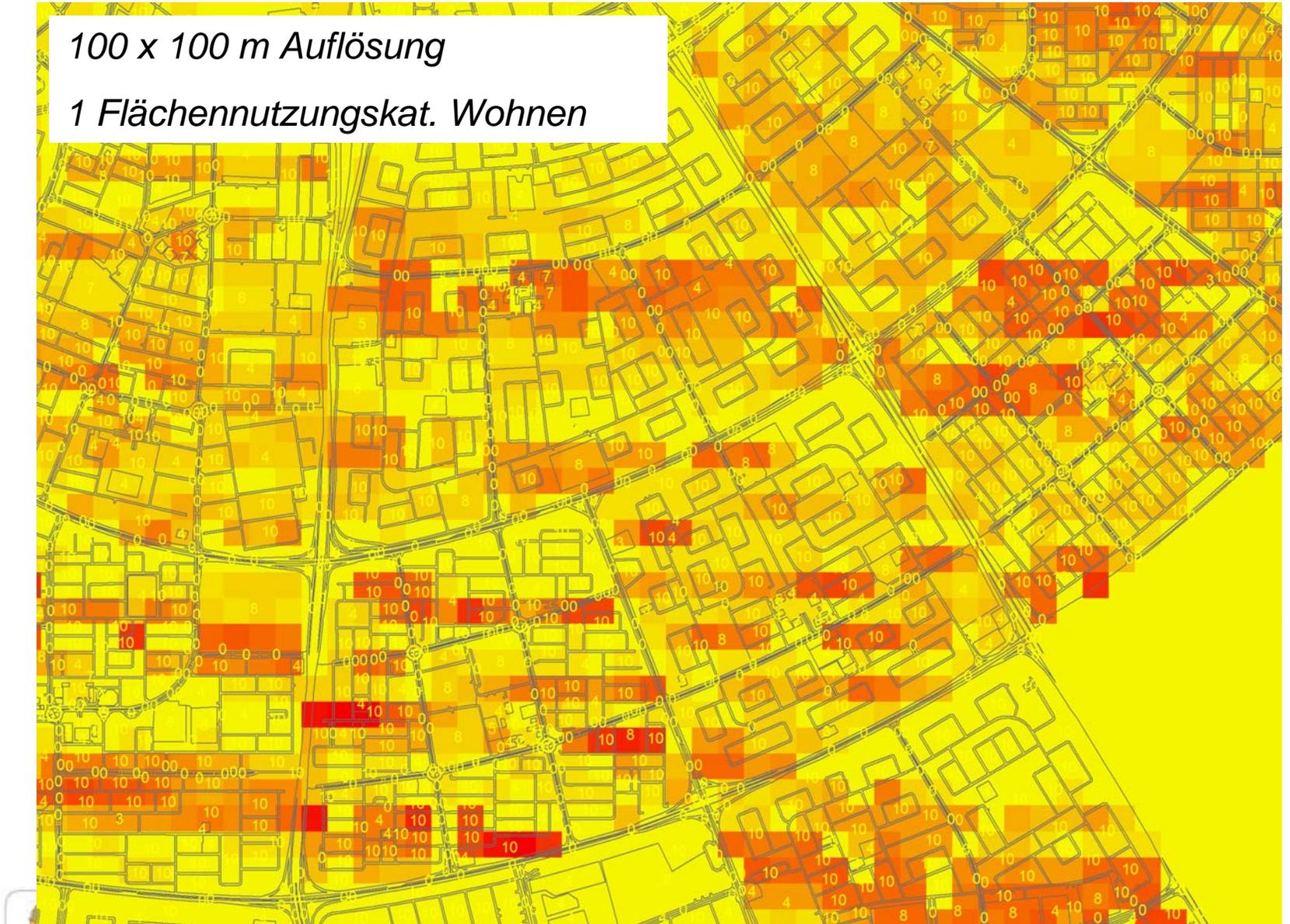
Neuer Ansatz: Dichteoberflächen



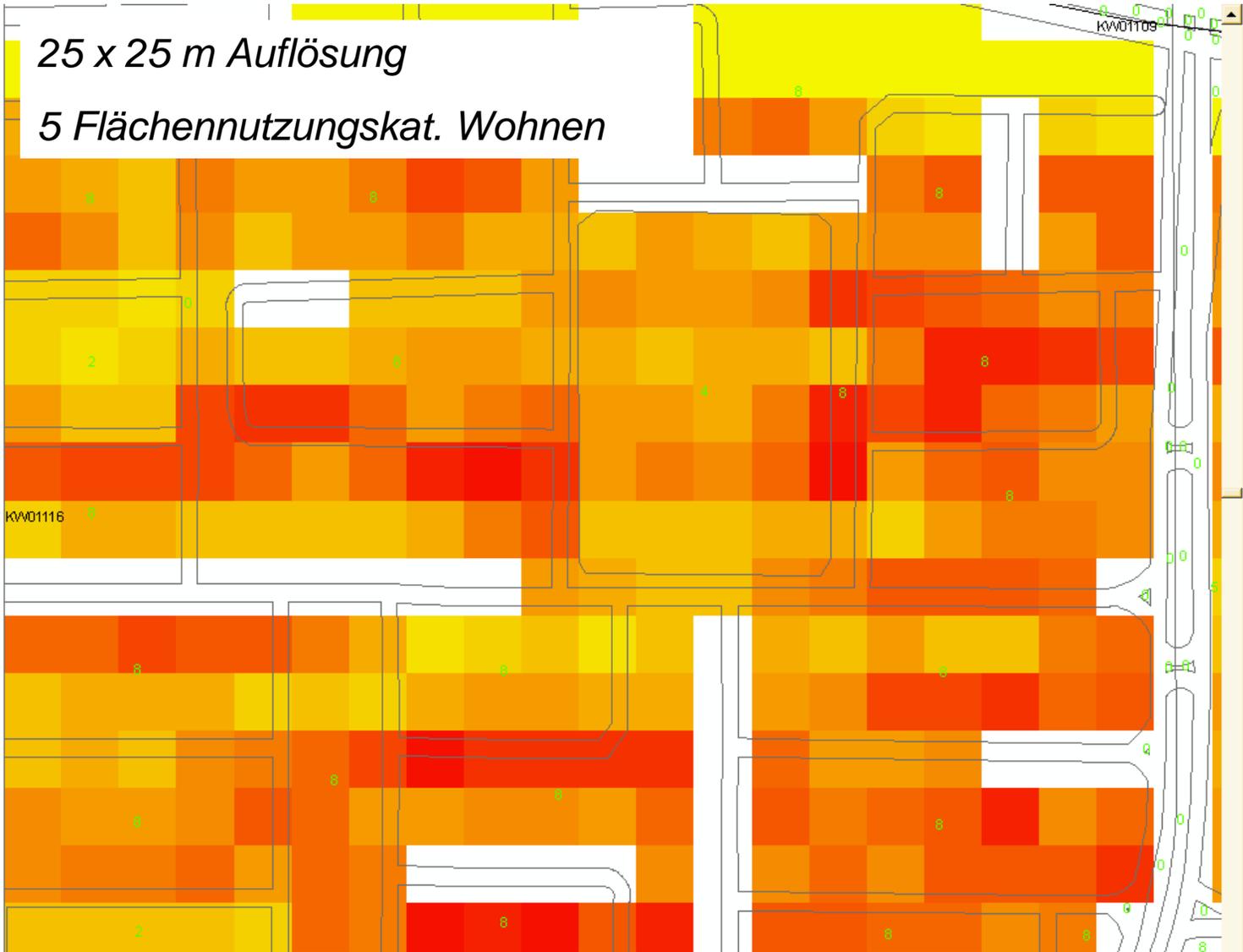
100 x 100 m Auflösung

1 Flächennutzungskat. Wohnen

Neuer Ansatz: Dichteoberflächen



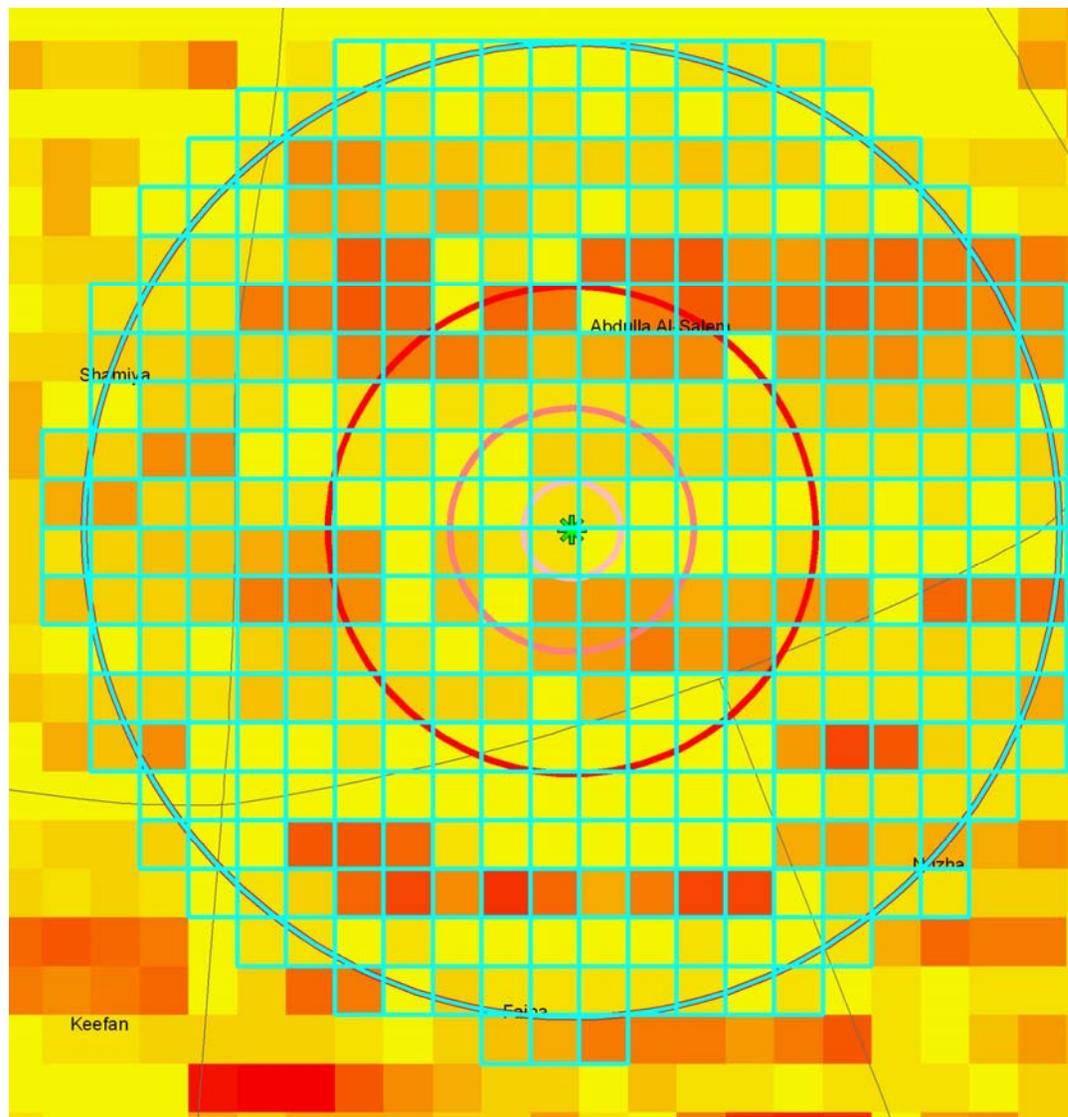
Neuer Ansatz: Dichteoberflächen



*Beispiel:
Immissionsbelastung mit
Staub/Lärm eines
Industrieemittenten*

Betroffene Bevölkerung

*100 m Radius : 51
250 m Radius: 252
500 m Radius: 986
1.000 m Radius: 3.933
5.000 m Radius: 43.447*



Hauptmenü (1), Toolbar (2), Kartenfläche (3), Legende (4)

1

2

3

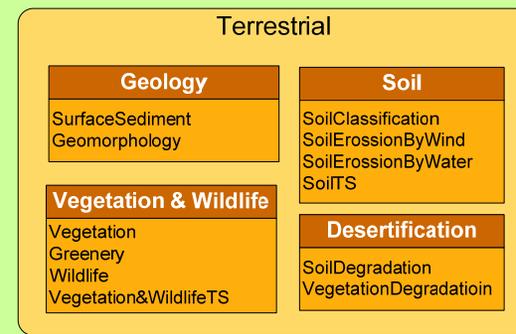
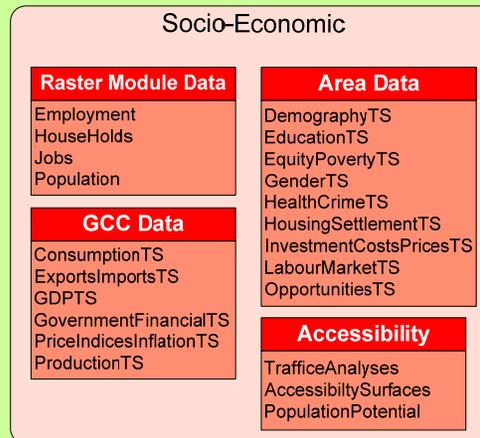
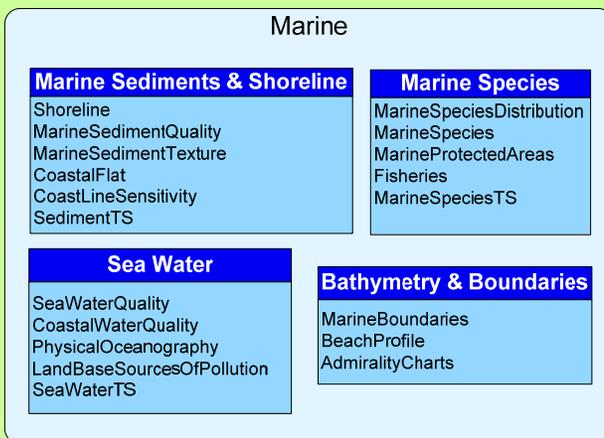
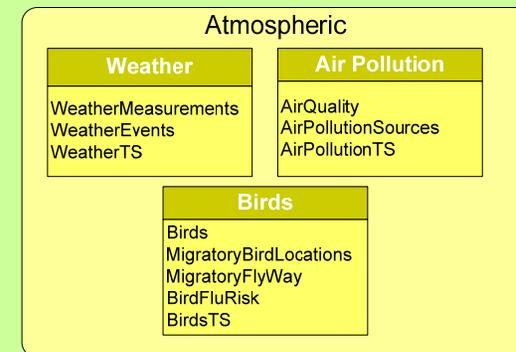
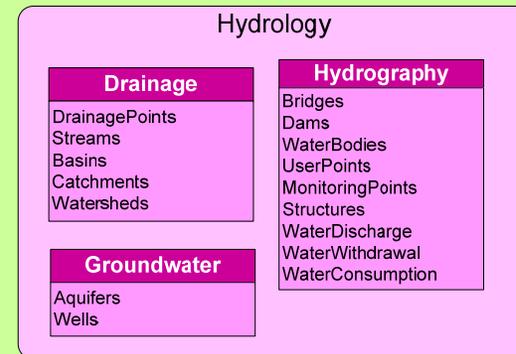
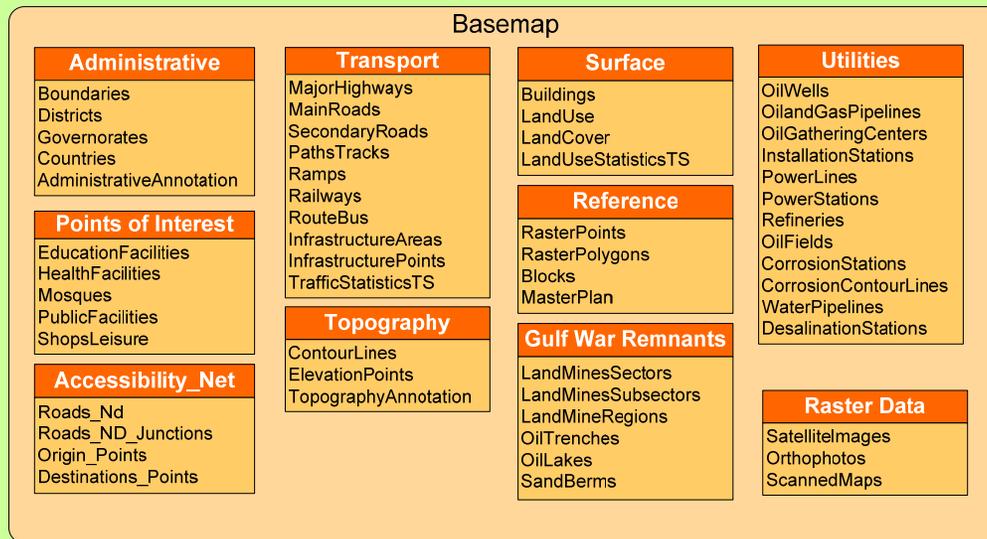
4

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KI EIN-III Datenbank

- **Daten-** und **objektorientiertes** Design
- **Standardisierung** (Rückgriff auf u. Modifizierung von ESRI Standarddatenmodellen)
- **Flexibilität** und “Skalierbarkeit”
- Berücksichtigung **existierender** und potenziell **neuer** Datensätze (zukünftige Erweiterungen)
- **Einfache**, klare und logische **Struktur**
- Berücksichtigung **zeitlicher Dynamiken** in den Daten

KISR KIEIN Conceptual Data Model



K I E I N B A S E M A P D A T A M O D E L

Public Facilities

This section contains several data tables and descriptive text for public facilities. The tables include columns for facility type, name, location, and other attributes. Descriptions provide details on how these facilities are represented in the database.

Utilities

This section contains data tables and descriptions for utilities. It includes tables for different utility types and their associated infrastructure, with detailed notes on data collection and representation.

Reference

This section contains reference data tables and descriptions, likely used for cross-referencing with other datasets or external information.

Topography

This section contains data tables and descriptions related to topography, including elevation and terrain data.

Administrative

This section contains data tables and descriptions for administrative boundaries and structures, such as districts and municipalities.

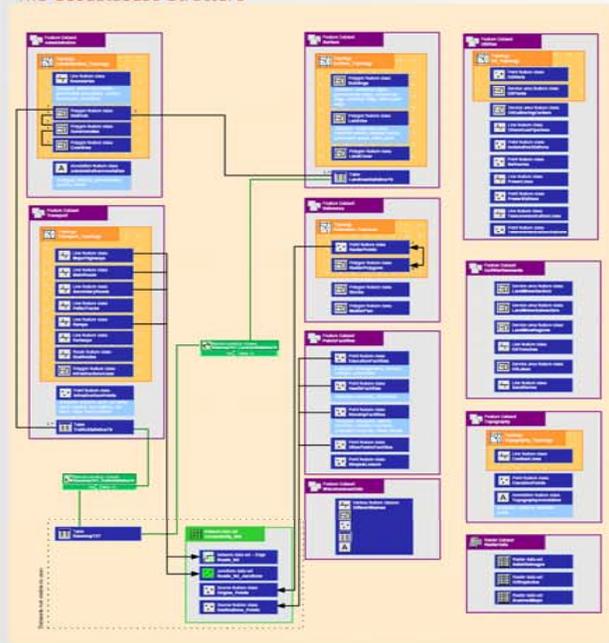
Time Series

This section contains data tables and descriptions for time series data, showing changes over time for various geographical features.

Gulf War Remnants

This section contains data tables and descriptions for remnants from the Gulf War, including unexploded ordnance and other military-related features.

The Geodatabase Structure



Transport

This section contains data tables and descriptions for transport infrastructure, including roads, railways, and airways.

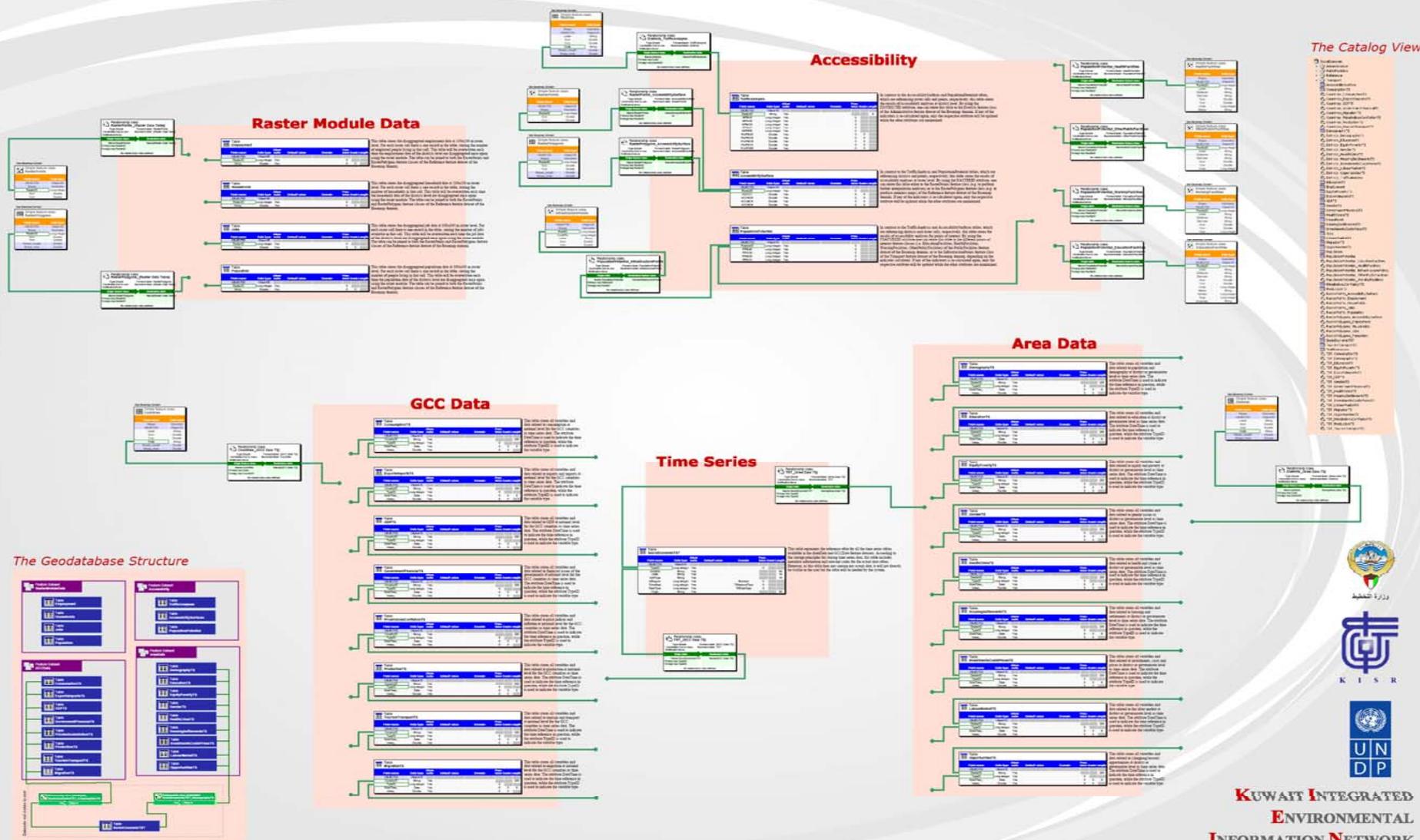
Surface

This section contains data tables and descriptions for surface features, such as water bodies, wetlands, and land cover.

The Catalog View



KIEIN SOCIO-ECONOMIC DATA MODEL



K I E I N T E R R E S T R I A L D A T A M O D E L

Geology



Desertification



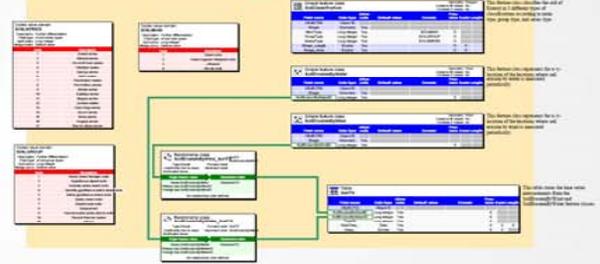
The Catalog View

- [-] Geology
 - [+] Desertification
 - [+] Desertification_1
 - [+] Desertification_2
 - [+] Desertification_3
 - [+] Desertification_4
 - [+] Desertification_5
 - [+] Desertification_6
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 - [+] Desertification_99
 - [+] Desertification_100

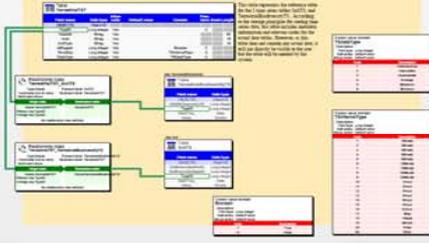
Terrestrial Biodiversity



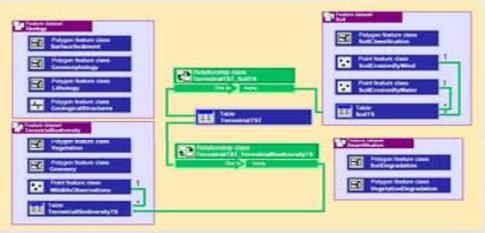
Soil



Time Series



The Geodatabase Structure



وزارة التخطيط



K I S R



UNDP

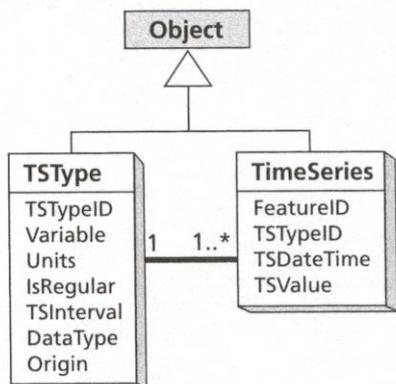
KUWAIT INTEGRATED ENVIRONMENTAL INFORMATION NETWORK



■ **TimeSeries** – Tabelle(n) zum Speichern von Zeitreihendaten

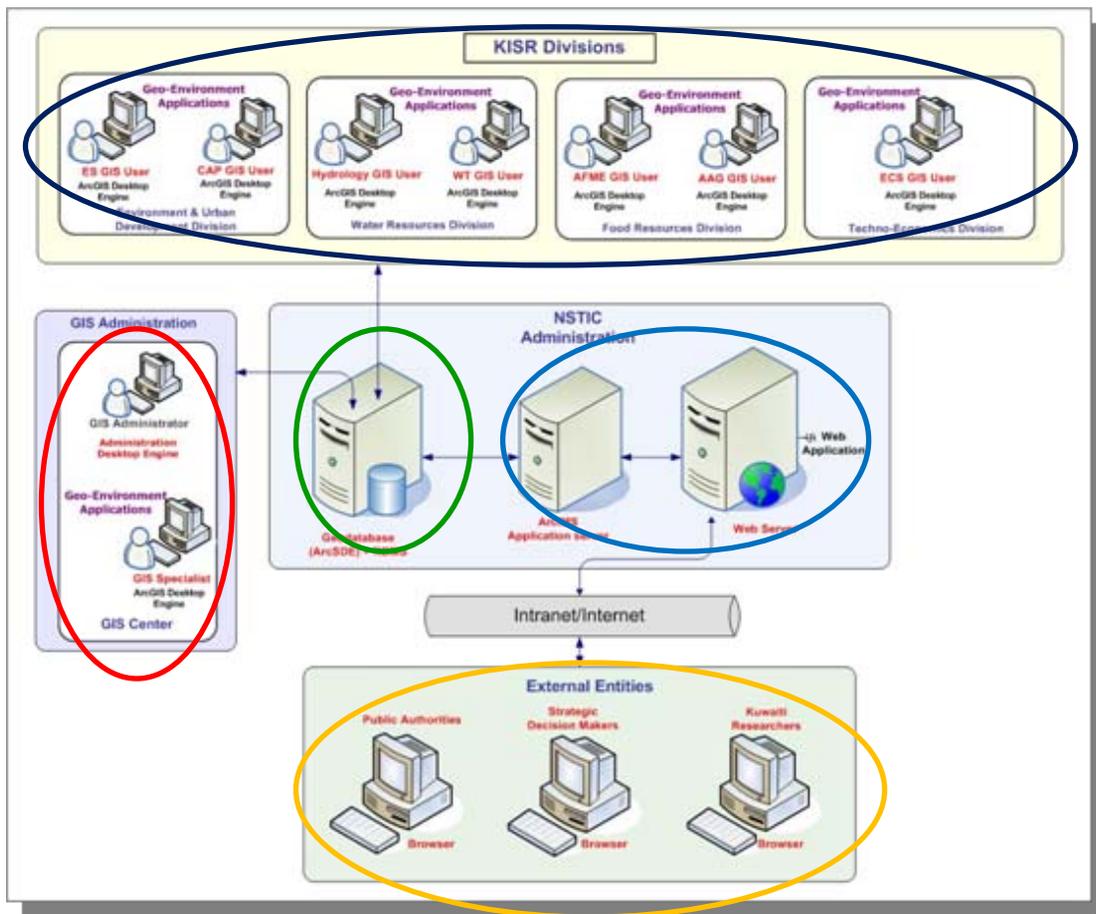
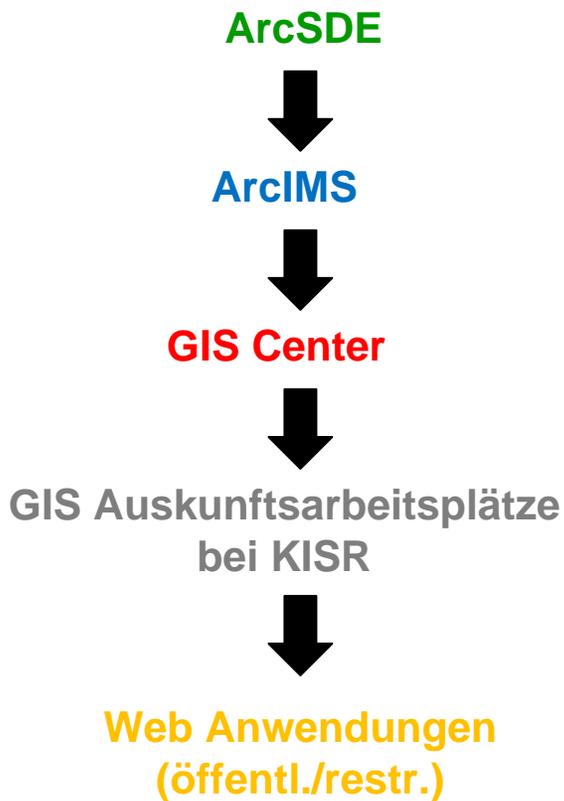
■ **TSType** – Tabelle zur Beschreibung der Datentypen

TSTypeID	Variable	Units	UnitType	IsRegular	TimeStep	TimeUnit	Data Type	Origin
1	Streamflow	cfs	Flow	Y	1	day	Interval	Recorded
2	Water Level	feet	Length	Y	15	min	Instantaneous	Modeled
3	Rainfall	inch	Length	Y	1	hour	Interval	Nexrad



OBJECTID	TSTypeID	Variable	Units
1	1	Water levels below land surface	feet
2	2	Dissolved Arsenic (storet code 01000)	UG/L

OBJECTID	FeatureID	TSTypeID	TSDateTime	Qualifier	TSValue
622355	1461	1	3/7/2004		-104
630492	1461	2	8/21/2003	<	2
26660	1461	1	8/21/2003		-113.9
26659	1461	1	12/16/2001		-114.68
26658	1461	1	12/11/2001		-104.65
26657	1461	1	12/5/2000		-118.75
26656	1461	1	12/12/1999		-116.4



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Icon Technologies
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Email: maged.samir@icon.com.eg

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