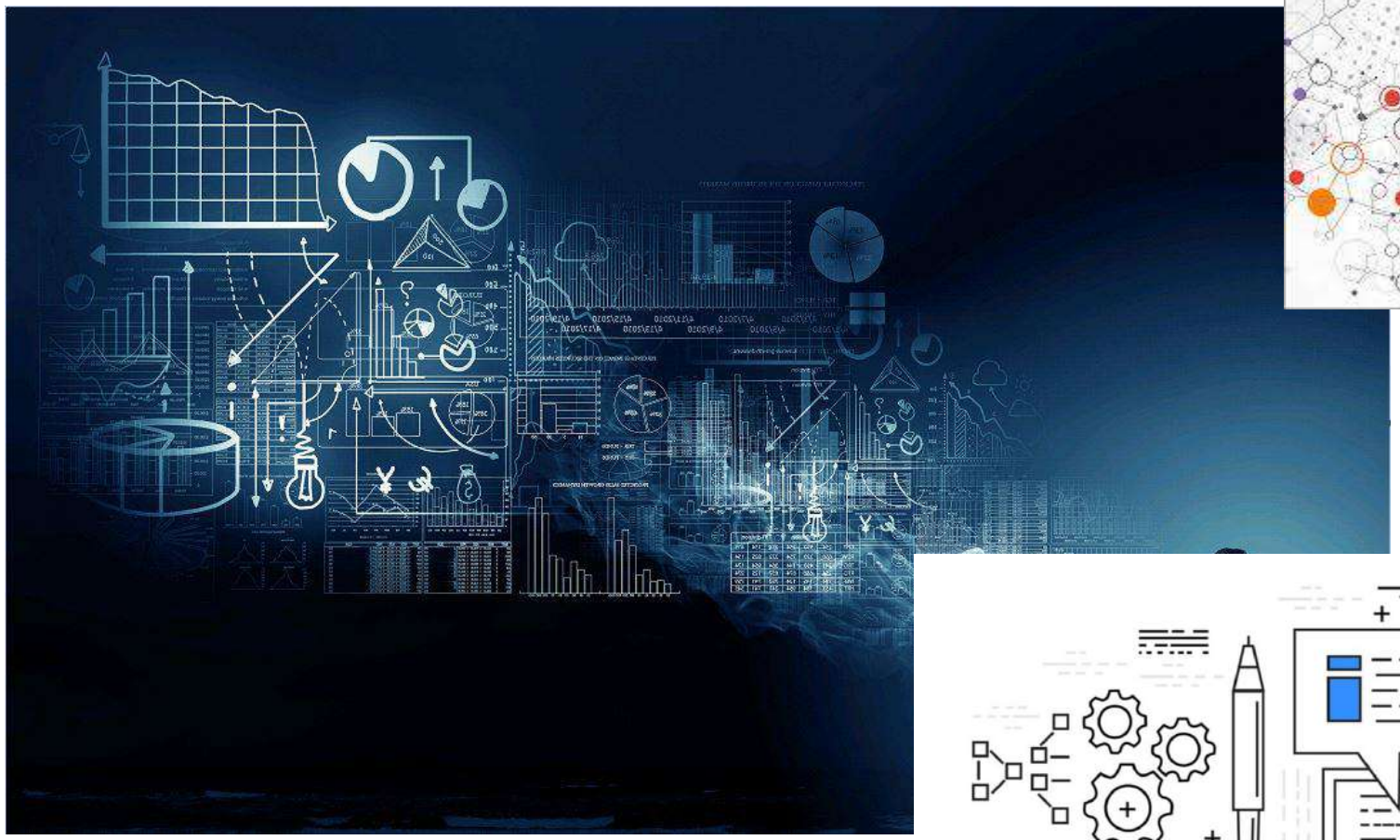
ICARDA

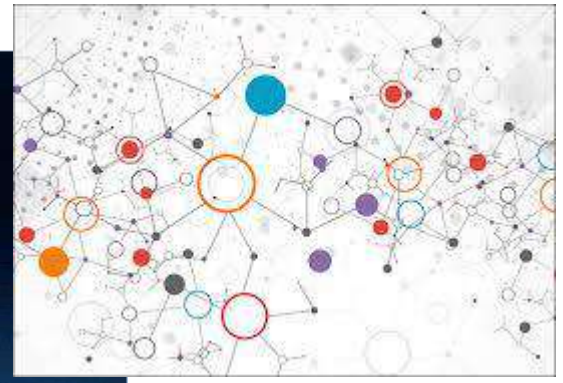
Science for resilient livelihoods in dry areas

Spatial Data Curation and quality control

Layal Atassi

- Data Curation or Management
- Defining data needs
- Spatial Data Infrastructures (SDI)
- standard





Information Data

Data Curation or Management

Includes acquiring, validating, storing, protecting, and processing required data to ensure the accessibility, reliability, and timeliness of the data for its users.

Spatial data curation is no deferens than dataset curation It requires

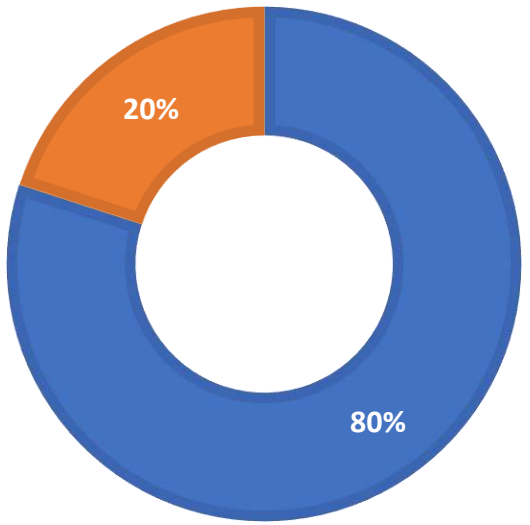
- Acquiring
- Validating
- Storing
- Maintaining
- And analyses data

To Ensure

- Accessibility
- Reliability

Spatial Data Curation

The process of defining, finding, acquiring, cleaning and integrating the data to account for somewhere between 70 and 80 per cent of the total time (and a similar proportion of the money) allocated to the project.



Defining data needs

In the old days, it was a big struggle to find available data that suits your project needs GIS users have to acquire the data themselves (**digitizing**).

Now sources of digital geospatial data are expanding daily, this brings its own **problems**.

- Are data available suitable for your purpose?
- How do you know you can trust those who captured it?
- Does the data contain any errors?
- does it contain the information that you require?
- Can you afford the data.

Emerging standards that relate to geospatial data and metadata. To assure "**FAIR**" principles: Findability, Accessibility, Interoperability, and Reusability.

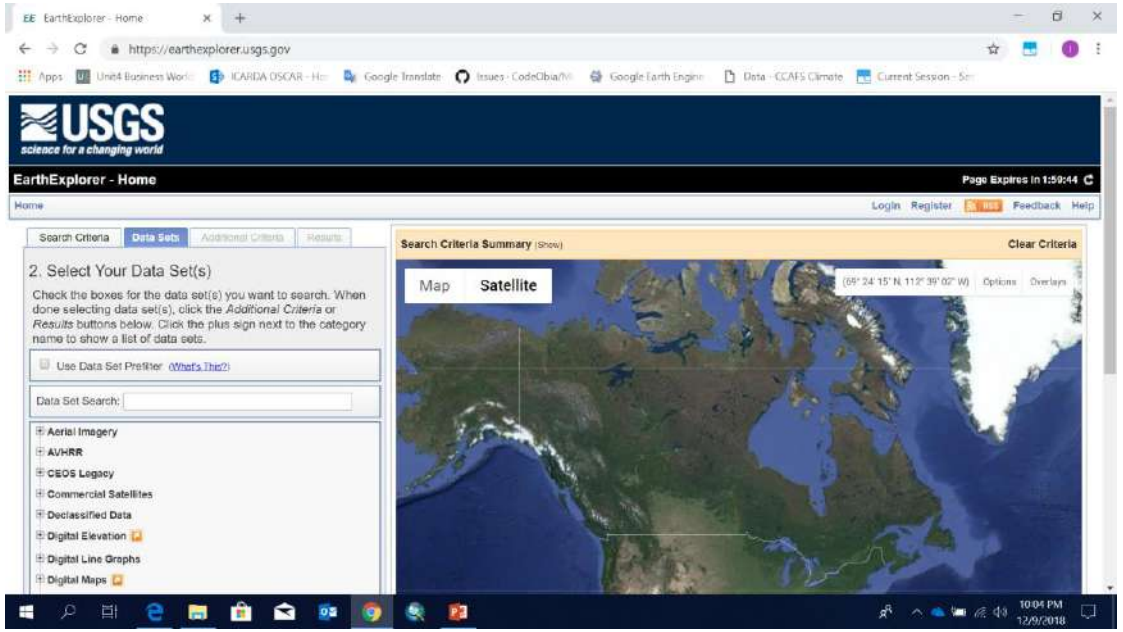
INfrastructure for SPatial Information in Europe (**INSPIRE**)

1) data should only need to be collected once.
2) data sets from member states should be combined seamlessly.
3) data should be shared across all tiers of government and between governments.
4) date should be available (either freely or at a cost) to all, if issues of confidentiality or security do not apply.
5) data discovery and data evaluation should be available to all.

SDIs comprise a number of elements

- data,
- metadata,
- discovery services,
- visualisation and accessibility services.

This lead to geo-portal
INSPIRE Geo-Portal (http://inspire-geoportal.ec.europa.eu/)



What is a standard?

A standard is a code of practice for a set of procedures to **create, store, transfer or use (spatial) data.**

Why are they needed ?

- increased availability of data;
- increased suitability of data for additional purposes beyond that for which they were originally created;
- increased efficiency in searching for data by the specification of common elements in metadata;
- improvements in the integration of datasets, which ultimately creates new information;
- improvements in spatial analysis through greater understanding of the data being used;
- reduce costs of creating and handling data;
- the generation of new market opportunities.

Who defines standards?

There are a large number of organisations involved in the definition of data standards.

- International Standards Organisation (ISO), operate at a global level
- In Europe standards are developed by the European Committee on Standardisation (CEN).
- British Standards Institute (BSI), operates at a national level
- Open GeoSaptial Consortium (OGC). The OGC is formed from a wide groups of users and vendors of geospatial data and services

Visit the following portals and explore the elements of SDI

http://geoagro.icarda.org/en/

http://www.fao.org/nr/gaez/en/

Thank You

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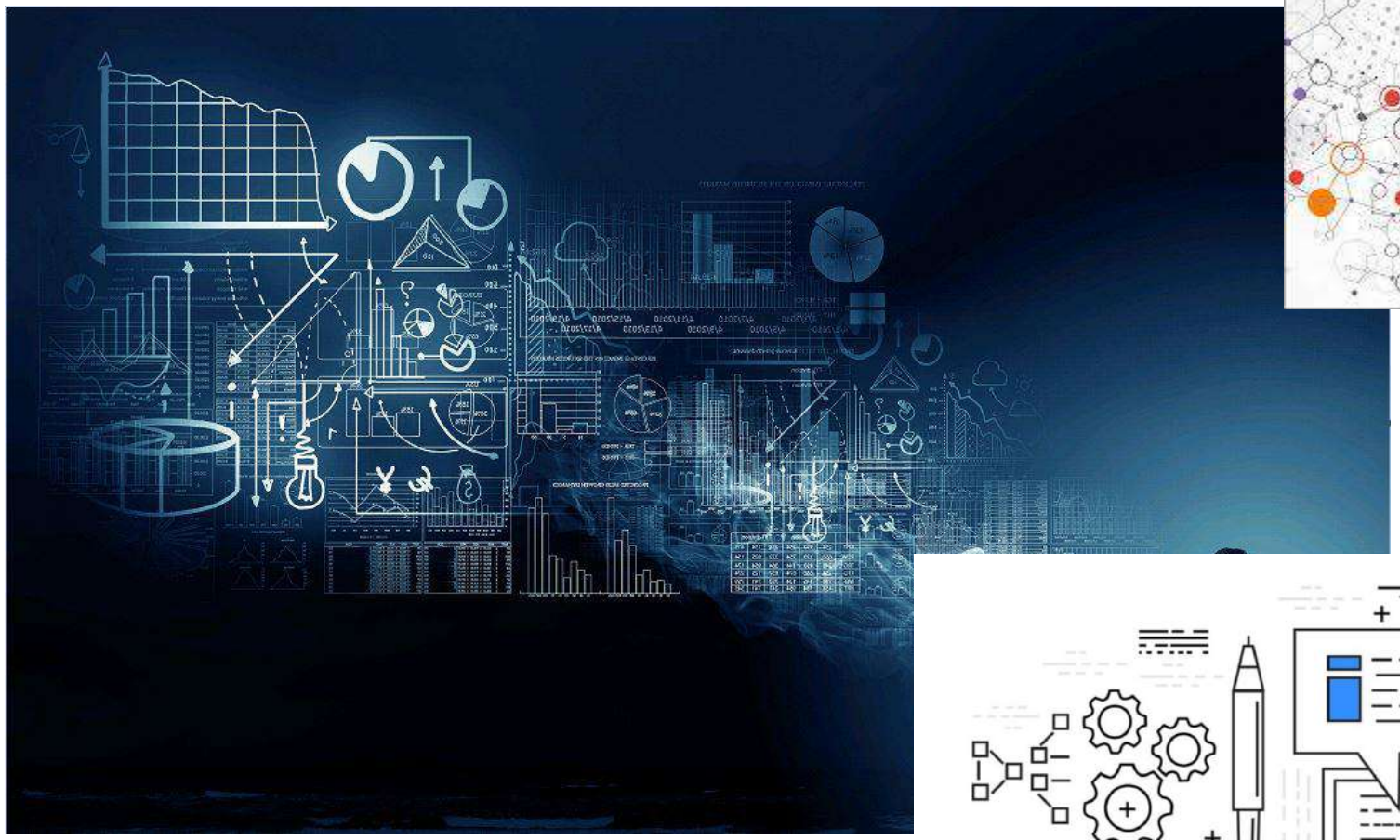
Science for resilient livelihoods in dry areas

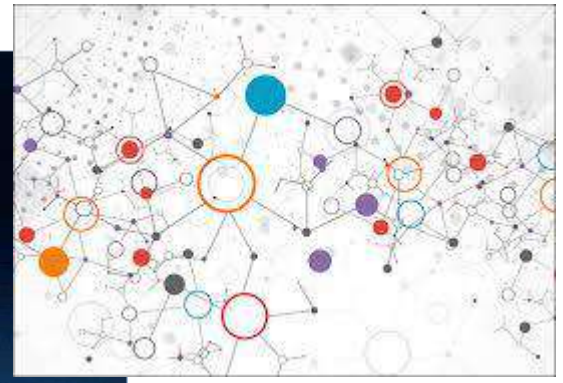
Metadata, Spatial data Curation

Layal Atassi

Metadata

- Definition
- History
- Important (FAIR)
- Element, schema and standards.





Information Data

Metadata

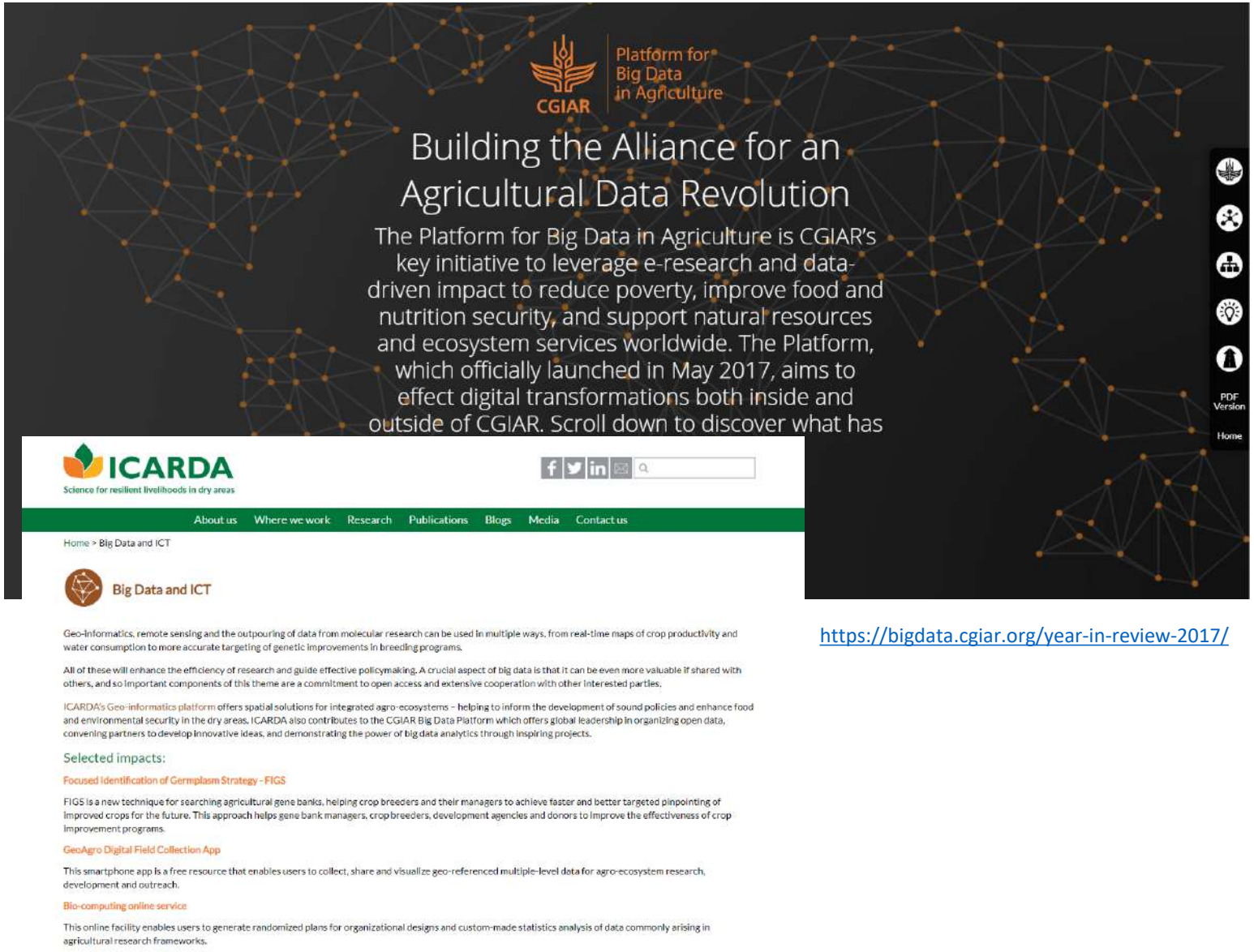
Data about data

Information about information

The term **metadata** has been used only in the **past 15 years**, and has become particularly common with the popularity of the **World Wide Web**

But **concepts** have been in use for as long as collections of information have been organized

As a CGIAR Research Center, ICARDA follows OA-OD under the “FAIR” principles: Findability, Accessibility, Interoperability, and Reusability



https://bigdata.cgiar.org/year-in-review-2017/

Geoportals elements

- data,
- metadata
- discovery services
- visualisation and accessibility services.

what is the use of metadata?

Discovery
provide a summary of the contents of data sets
to facilitate the searching for those data sets
by users.

Provide information on
Contents of a *data set*

Give **detailed descriptions** of
Individual objects in a data set

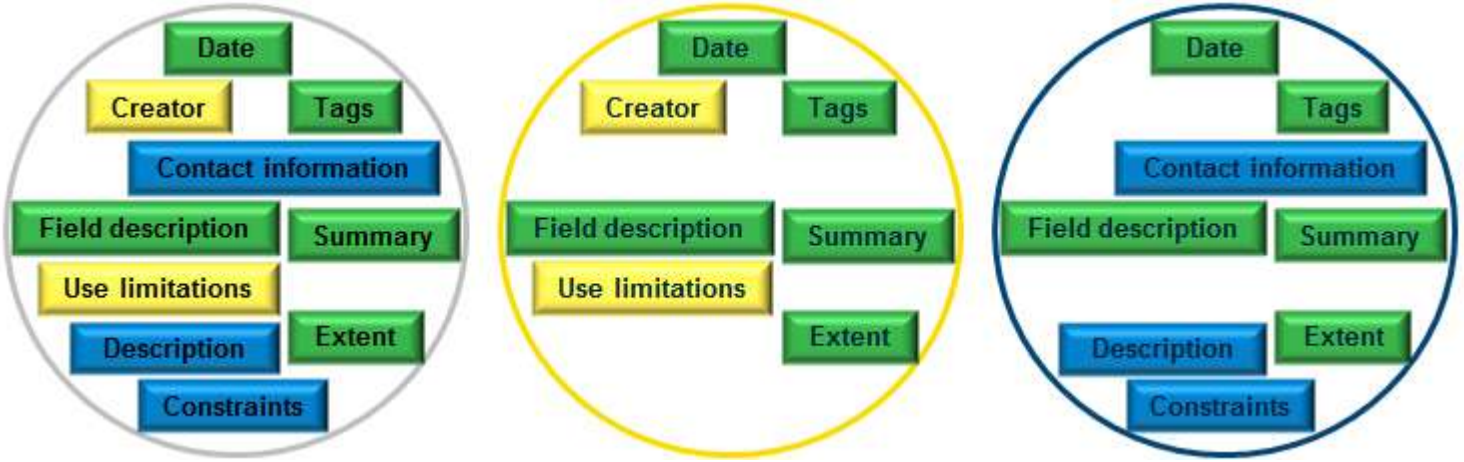
Why metadata is important?

1) Exchange information between
- One department
- Organizations
- Word wide web

2) Quality check
3) suiting for purpose

Metadata consist of several element, those element forms metadata schema. Different organizations uses different schema depend on the organization need and purpose.

CG Core, is set of metadata elements used by CGIAR Research Center and CRP repositories, in order to facilitate cross-repository searching and enhance discovery of CGIAR information products through Open Access.



Metadata standards:

Metadata schemes that are developed and maintained by standard organizations (such as ISO) or organizations that have taken on such responsibility (such as the Dublin Core Metadata Initiative) are called metadata standards.

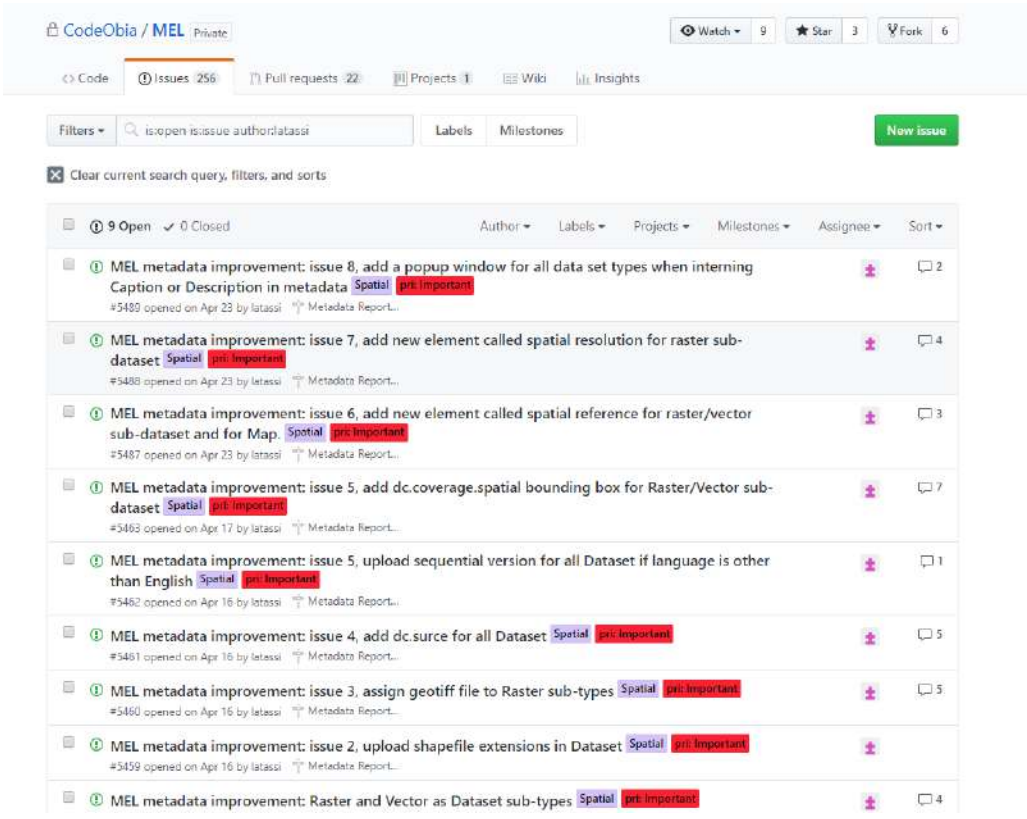
Increasingly metadata standards are being based on international definitions.
ISO 19139 metadata Implementation

Metadata elements recorded include the spatial extent of the data set; the map projection and coordinate system used; the temporal dimension of the data and a measure of the quality of the spatial data.

Quality and validation elements for spatial data added to CG core:

- Spatial resolution: describe the level of detail of the data
- Spatial reference system: coordinate base location, regional or global system used to locate geographic entities.
- Description: Caption description or abstract, should contain a brief narrative summary of the resource's content (lineage contain process history and/or overall quality of the spatial data set)

- Dataset source: the original source of the data or from where the data is obtained.
- Coverage: geographical extend or bounding box.



FAIR principles: Findability, Accessibility, Interoperability, and Reusability

Findability: Title, Subject (keywords), Publisher, Date.

Accessibility: metadata should be visible and linked with its corresponding datasets on geoportal.

Interoperability: Format. Many current schemes use Standard Generalized Markup Language (SGML) or XML to specify their syntax.

Reusability: Rights, Coverage, Temporal coverage, Description, Resolution, Spatial reference system.

Element	Value
Title	Actual Evapotranspiration of irrigated areas in 2002
Creator	Biradar C.
Subject	Evapotranspiration
Subject	Euphrates river
Subject	Tigress river
Subject	River basin
Description	This layer was one of the layers produced for “Supporting Coordination and Cooperation in Water Management in the Euphrates and Tigris Area CPET” project. The project aims to assess the status of water use in agriculture in the Euphrates-Tigress basin, determine and map the agricultural water productivity and identify options for improving it in problem areas of the basin in Turkey, Syria and Iraq. Evapotranspiration was determined using the methodology proposed by USGS’s Simplified Surface Energy Balance. The Actual Evapotranspiration estimation was done using MODIS 1km (thermal infrared band resolution) pixel, the layer was resample to be used in further calculation. The AET was for 2002, which was wet year and hence considered a surplus year based on the annual mean precipitation data at the basin level estimated by SIWI. The irrigated areas were determined based on IWMI’s irrigated and rainfed area mapping procedures.
Publisher	ICARDA
Contributor	Atassi L.
Contributor	Oweis T.
Date	15/6/2017
Date	31/12/2020
Type	Raster
Format	GeoTIFF
Identifier	
Source	
Language	EN
Relation	http://geoagro.icarda.org/AWP-ETbasin/index.html
Relation	
Coverage	lower left corner
Coverage	upper right
Coverage	Turkey
Coverage	Syria
Coverage	Iraq
Coverage	2002
Rights	Open data
Contact	
Spatial reference system	WGS84
Spatial resolution	0.004945

Thank You

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Data curation and quality control

Layal Atassi

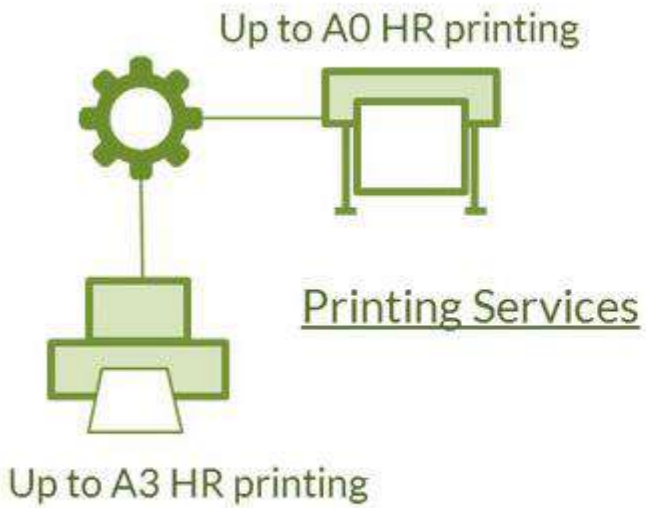
Data sources (capturing)

- Primary data capture: is where direct measurements made from real world objects can be put straight into a GIS. Example remote sensing, surveying, GPS surveys and laser scanning (or LiDAR).

- Secondary data capture: is where we capture the data into the GIS from another existing data source. Examples scanning aerial photographs and maps, and digitizing of existing maps to create vector data sets in the GIS.

- Data transfer: use existing digital sources, which are then translated into a form recognized by your GIS. Data transfer can range from being relatively easy, to being very complicated, depending on the nature of the data being capture.

We could use the digitizing process to trace objects from remote sensing data, such as satellite imagery or aerial photography.



Field and Laboratory instruments

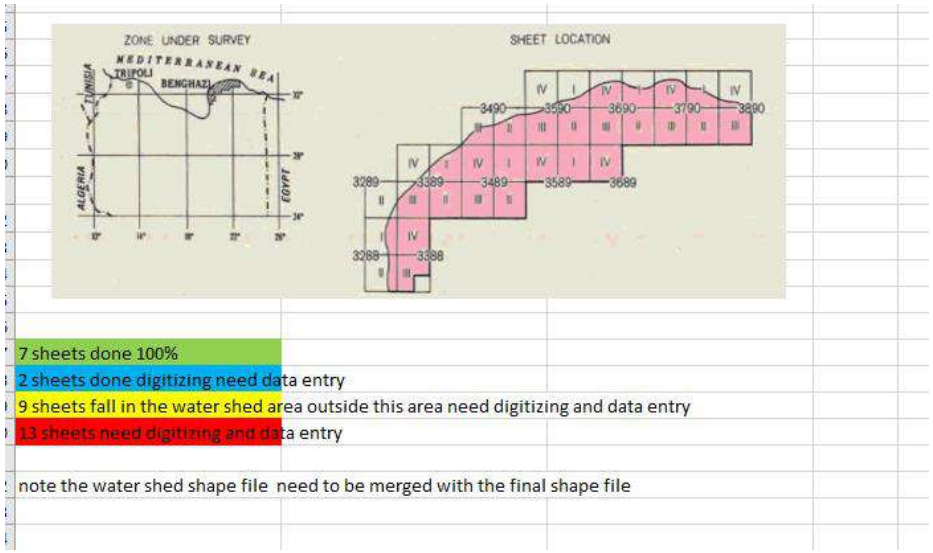
Data capture stages

Planning

1) Source/Document selection and collation
2) Document Description
3) Data Selection

Preparation

4) Scanning of source
5) Source preparation



	A	B	C	D	E	F
1				% Done	%remins	
2	SHEET	3288-I	Exist	100%	0	
3	SHEET	3288-II	Exist	100%	0	
4	SHEET	3289-II	Missing			
5	SHEET	3388-III	Exist	100%	0	
6	SHEET	3388-IV	Exist	100%	0	
7	SHEET	3389-I	Exist	95%	5	
8	SHEET	3389-II	Exist	100%	0	
9	SHEET	3389-III	Exist	100%	0	
10	SHEET	3389-IV	Exist	100%	0	
11	SHEET	3489-I	Exist/Done	25%	75	
12	SHEET	3489-II	Exist	0%	100	
13	SHEET	3489-III	Exist	0%	100	
14	SHEET	3489-IV	Exist	50%	50	
15	SHEET	3490-II	Exist/Done	40%	60	
16	SHEET	3490-III	Exist	0%	100	
17	SHEET	3589-I	Exist/Done	80%	20	
18	SHEET	3589-IV	Exist/Done	45%	65	
19	SHEET	3590-I	Exist	0%	100	
20	SHEET	3590-II	Exist/Done	30%	70	
21	SHEET	3590-III	Exist/Done	60%	40	
22	SHEET	3590-IV	Exist/Done	30%	70	
23	SHEET	3689-IV	Exist/Done	10%	90	
24	SHEET	3690-I	Exist	0%	100	
25	SHEET	3690-II	Exist	0%	100	
26	SHEET	3690-III	Exist/Done	15%	85	
27	SHEET	3690-IV	Exist	0%	100	
28	SHEET	3790-I	Exist	0%	100	
29	SHEET	3790-II	Exist	0%	100	
30	SHEET	3790-III	Exist	0%	100	
31	SHEET	3790-IV	Exist	0%	100	
32	SHEET	3890-III	Exist	0%	100	
33	SHEET	3890-IV	Exist	0%	100	

Data capture stages

Digitizing

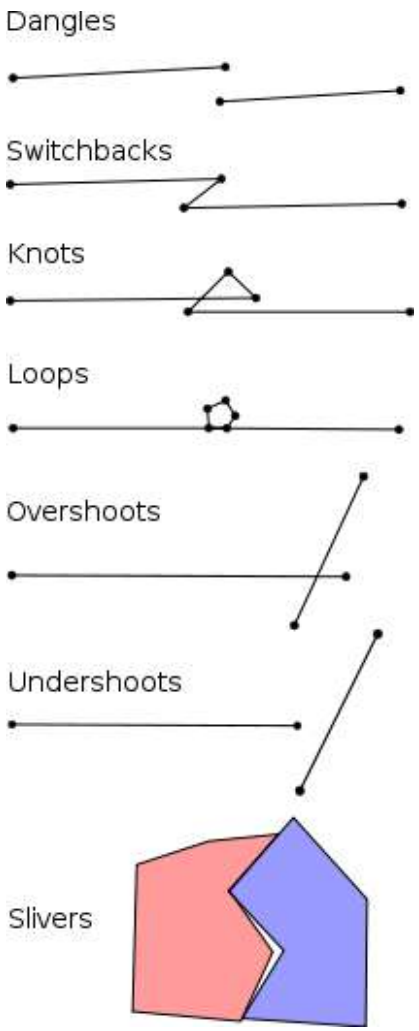
6) Digitizing of source
7) Capture of attributes
8) Creation of metadata

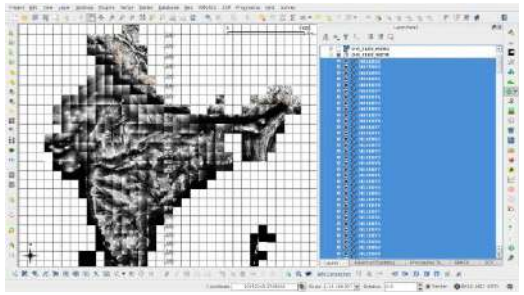
Editing/Improvement

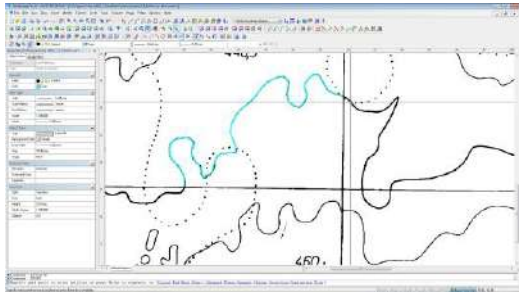
9) Editing of spatial feature
10) Joining/edge matching
11) Re-projecting data

Evaluation

12) Checking for obvious errors in both spatial and attribute data

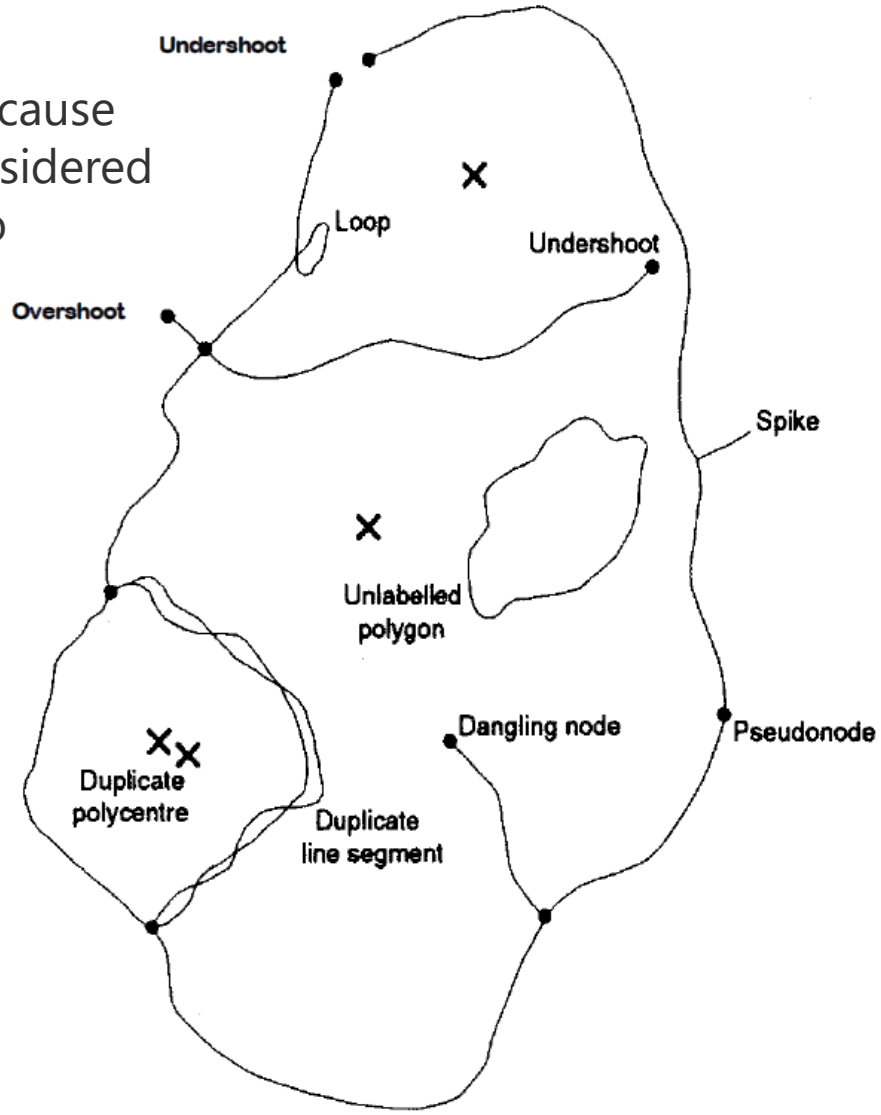






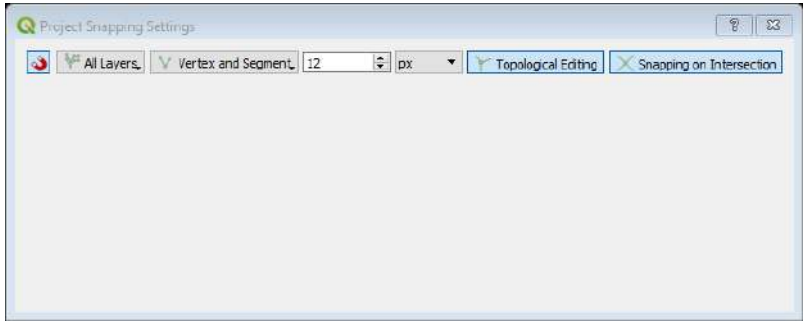
Feature Topology

Topology is a useful aspect of vector data layers, because it minimizes errors such as overlap or gaps. It is considered one of the best practices in capturing vector data to minimize error.



Snapping

To make topological editing easier, it's best if you enable snapping. This will allow your mouse cursor to snap to other objects while you digitize.

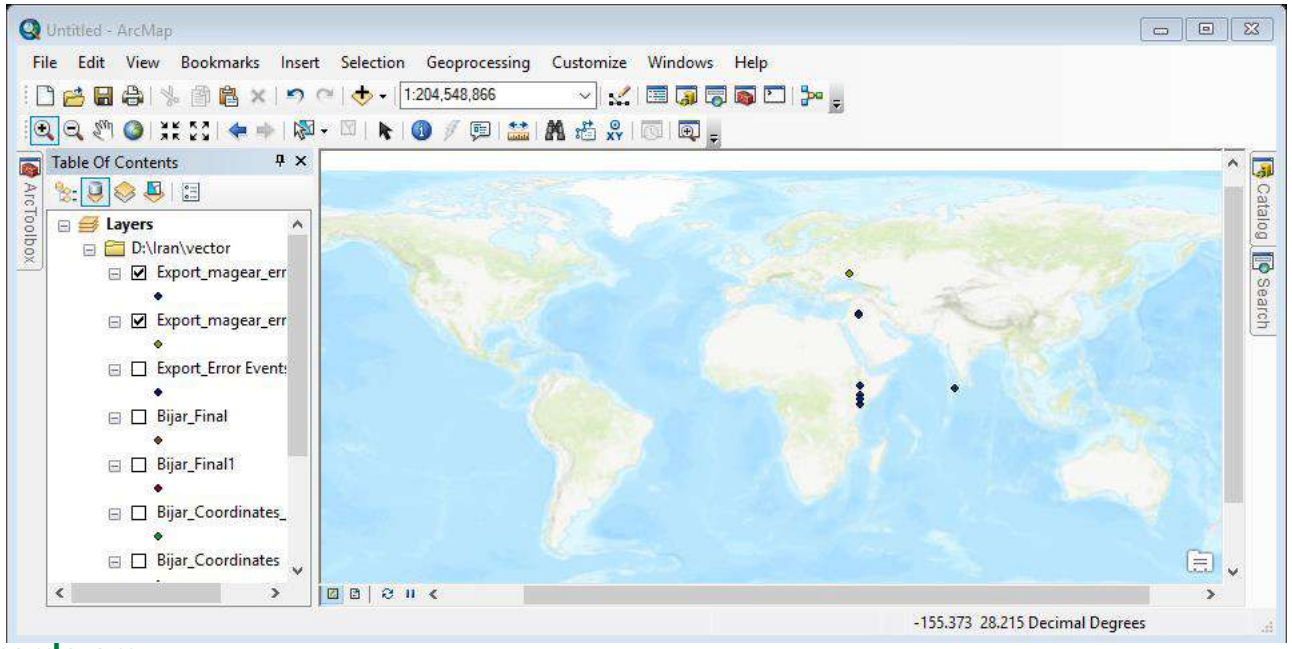


Survey with GPS information and error detection

The coordinate is corrected from the following issues

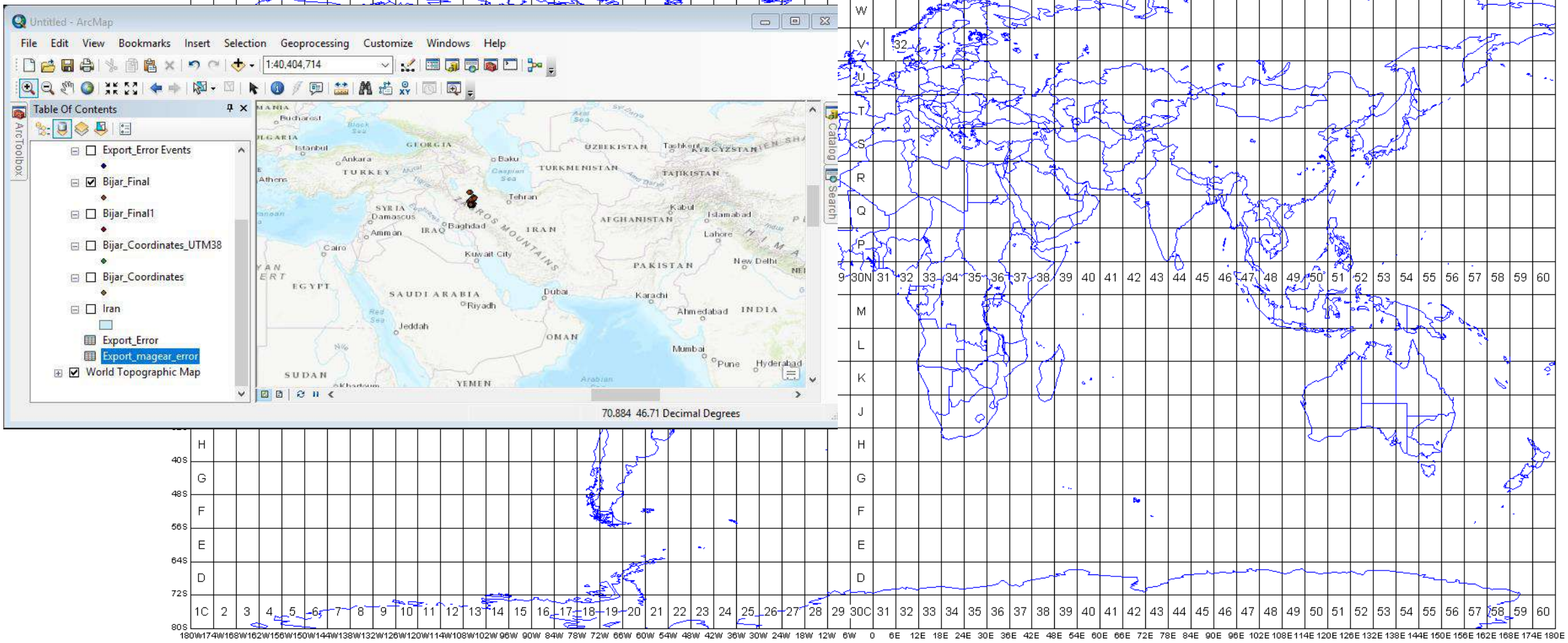
- Mixed between Long and Lat while entering the data (the records was converted)
- Some records with data entry error (decimals removed or added)
- UTM Long/Lat chanced to decimal degrees

From 88 Only 8 records could not be fix and were removed.



	Farmer code	Longitude	Latitude
2	Bi-W-1	47.64	36.31
3	Bi-W-2	47.67	36.24
4	Bi-W-3	36.27	47.77
5	Bi-W-4	36.27	47.78
6	Bi-W-5	47.39	35.54
7	Bi-W-6	47.48	355740.00
8	Bi-W-7	47.37	355694.00
9	Bi-W-8	47.38	355340.00
10	Bi-W-9	47.27	354250.00
11	Bi-W-10	47.25	354130.00
12	Bi-W-11	39.55	38722382.00
13	Bi-W-12	47.37	355691.00
14	Bi-W-13	47.37	355688.00
15	Bi-W-14	47.25	354122.00
16	Bi-W-15	47.34	360120.00
17	Bi-W-16	47.26	355752.00
18	Bi-W-17	47.41	355540.00
19	Bi-W-18	47.34	355342.00
20	Bi-W-19	47.34	354288.00
21	Bi-W-20	47.43	355010.00
22	Bi-W-21	47.37	355689.00
23	Bi-W-22	47.30	354428.00
24	Bi-W-23	47.27	354250.00

Sheet1 Sheet2 Sheet3


Untitled - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:40,404,714
Table Of Contents
Export_Error Events
Bijar_Final
Bijar_Final1
Bijar_Coordinates_UTM38
Bijar_Coordinates
Iran
Export_Error
Export_magear_error
World Topographic Map
ArcToolbox
Catalog
Search
70.884 46.71 Decimal Degrees
Tehran
Baghdad
Damascus
Amman
Cairo
Kuwait City
Riyadh
Jeddah
Dubai
Karachi
Kabul
Islamabad
Lahore
New Delhi
Ahmedabad
Mumbai
Pune
Hyderabad
Tashkent
Baku
Ankara
Istanbul
Athens
Bucharest
TURKEY
SYRIA
IRAQ
IRAN
AFGHANISTAN
PAKISTAN
INDIA
SAUDI ARABIA
EGYPT
SUDAN
YEMEN
OMAN
UZBEKISTAN
TURKMENISTAN
TAJIKISTAN
GEORGIA
ZAGROS MOUNTAINS

Planting date (... / ... / ... 139)

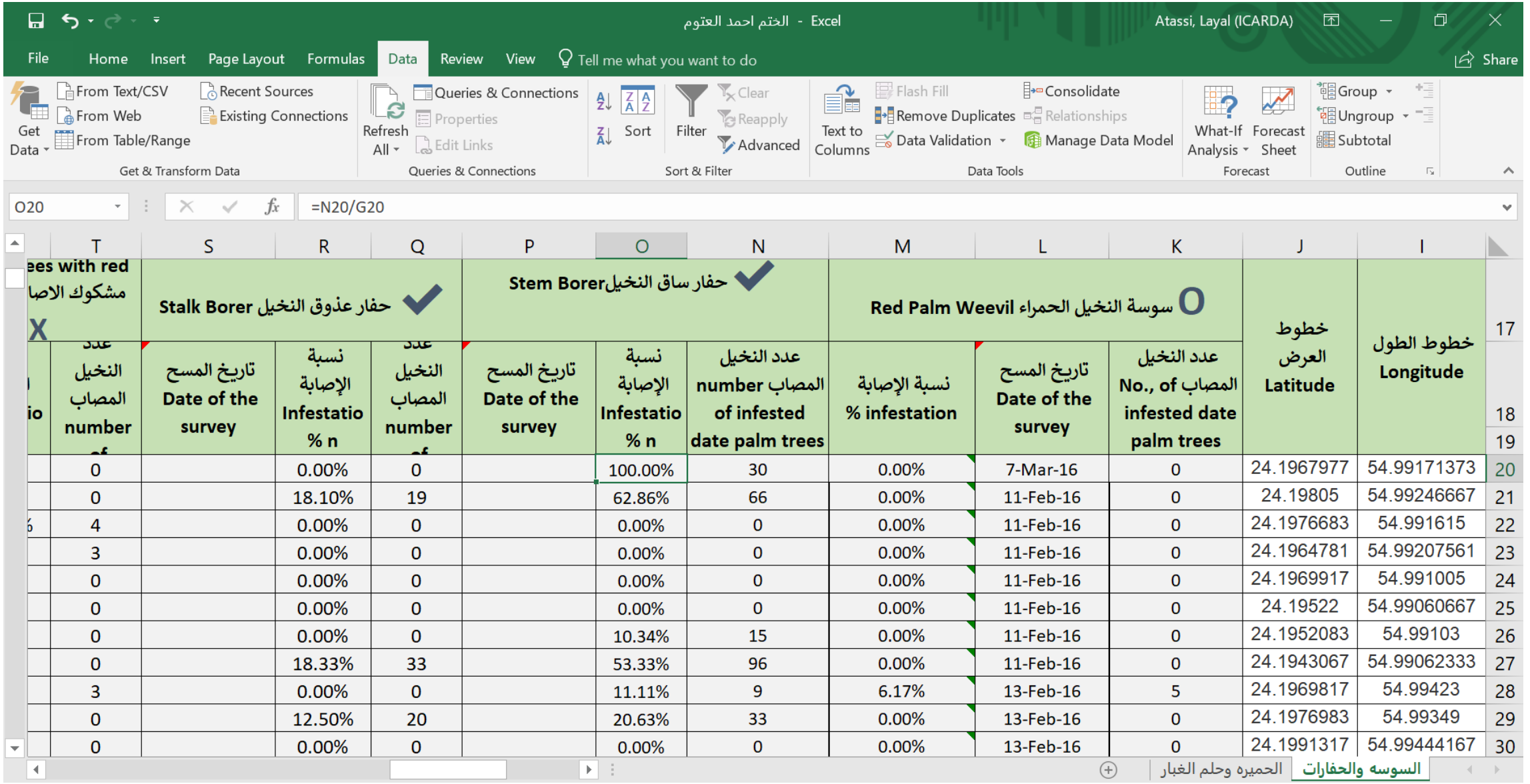
1396/7/23
1396/7/18
1396/7/16
1396/7/23
96/7/25
96/7/30
96/8/1
96/7/28
96/7/24
96/7/29
96/7/26

For data integration and Interoperability, the data should be converted to a standards format. Usually the following format is used yyyymmdd

رقم ارضي - تحويلة	
مطلوب سيارة	لا
بحاجة الى سائق	لا
عدد المزارع المخصصة للمرشد الزراعي	141

تفاصيل المزرعة Farm Details

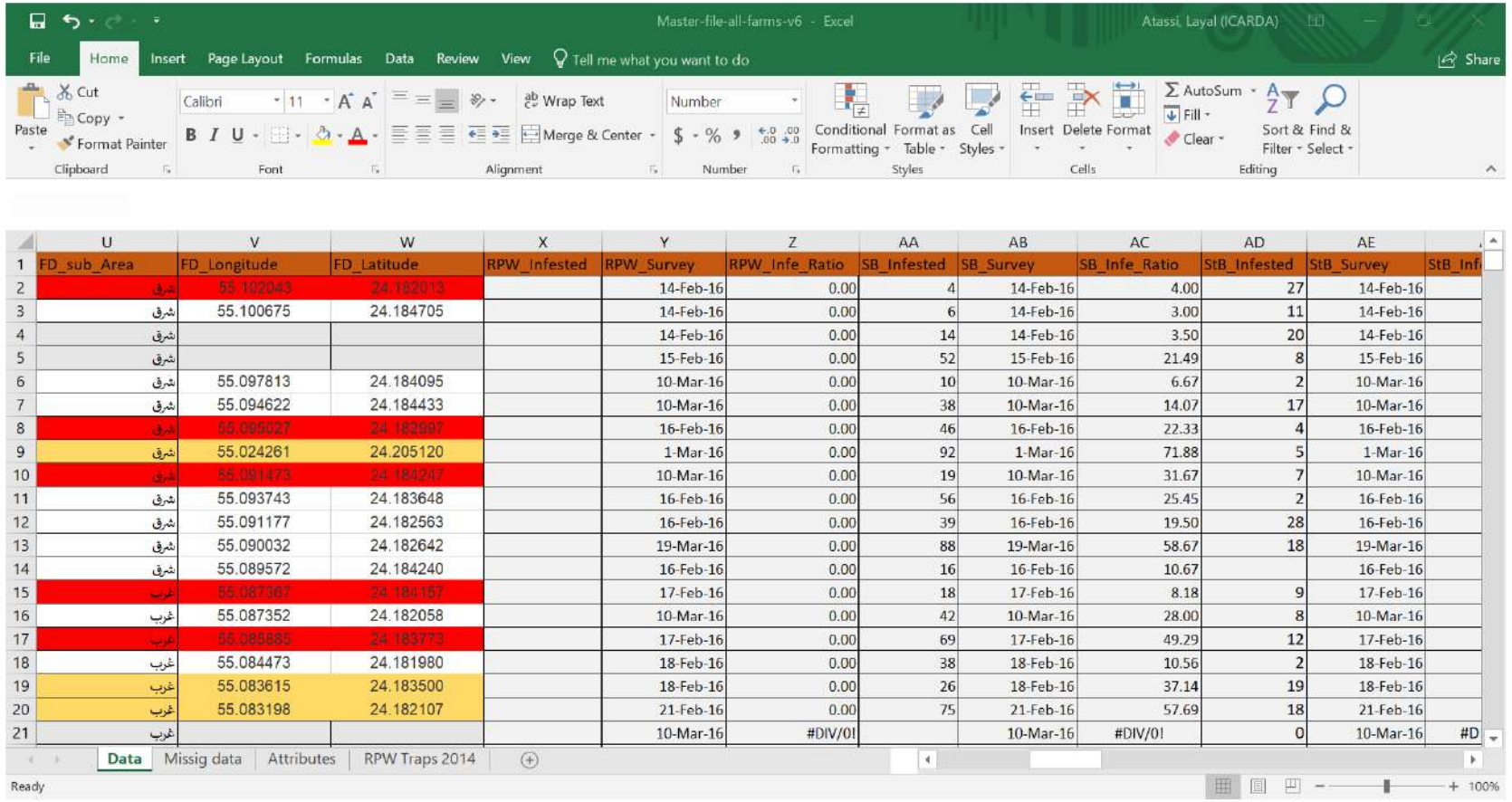
رقم Number	المنطقة Area	المركز Extension Center	اسم مالك المزرعة Farm Owner	رقم هاتف مالك المزرعة Farm .Owner Tel Number	رقم المزرعة Farm Number	عدد أشجار النخيل الكلي Total date palm number	المحضر Mahdar or sub area	خطوط الطول Longitude	خطوط العرض Latitude	عدد النخ المصاب of sted date m trees	س O
1	ابو ظبي - الختم	الختم						55.01782833	24.1979633		
2	ابو ظبي - الختم	الختم						55.01957	24.1978167		
3	ابو ظبي - الختم	الختم						55.007615	24.2025317		
4	ابو ظبي - الختم	الختم									
								55.01048667	24.2013167		
								55.01212333	24.2009583		
								55.01495333	24.200615		


الختم احمد العتوم - Excel
Atassi, Layal (ICARDA)
File Home Insert Page Layout Formulas Data Review View Tell me what you want to do Share
Get Data From Text/CSV From Web From Table/Range Recent Sources Existing Connections
Refresh All Queries & Connections Properties Edit Links
Sort Filter Clear Reapply Advanced
Text to Columns Flash Fill Remove Duplicates Data Validation Consolidate Relationships Manage Data Model
What-If Analysis Forecast Sheet
Group Ungroup Subtotal
Get & Transform Data
Queries & Connections
Sort & Filter
Data Tools
Forecast
Outline
O20
=N20/G20
ees with red مشكوك الاصا X
حفار عذوق النخيل Stalk Borer
حفار ساق النخيلStem Borer
O سوسة النخيل الحمراء Red Palm Weevil
عدد النخيل المصاب number of
تاريخ المسح Date of the survey
نسبة الإصابة Infestatio % n
عدد النخيل المصاب number of
تاريخ المسح Date of the survey
نسبة الإصابة Infestatio % n
عدد النخيل المصاب number of infested date palm trees
نسبة الإصابة % infestation
تاريخ المسح Date of the survey
عدد النخيل المصاب No., of infested date palm trees
خطوط العرض Latitude
خطوط الطول Longitude
0 0.00% 0 100.00% 30 0.00% 7-Mar-16 0 24.1967977 54.99171373
0 18.10% 19 62.86% 66 0.00% 11-Feb-16 0 24.19805 54.99246667
4 0.00% 0 0.00% 0 0.00% 11-Feb-16 0 24.1976683 54.991615
3 0.00% 0 0.00% 0 0.00% 11-Feb-16 0 24.1964781 54.99207561
0 0.00% 0 0.00% 0 0.00% 11-Feb-16 0 24.1969917 54.991005
0 0.00% 0 0.00% 0 0.00% 11-Feb-16 0 24.19522 54.99060667
0 0.00% 0 10.34% 15 0.00% 11-Feb-16 0 24.1952083 54.99103
0 18.33% 33 53.33% 96 0.00% 11-Feb-16 0 24.1943067 54.99062333
3 0.00% 0 11.11% 9 6.17% 13-Feb-16 5 24.1969817 54.99423
0 12.50% 20 20.63% 33 0.00% 13-Feb-16 0 24.1976983 54.99349
0 0.00% 0 0.00% 0 0.00% 13-Feb-16 0 24.1991317 54.99444167
الحميره وحلم الغبار
السوسه والحفارات

1. All seven excel document for Al Khattem was merged in one excel sheet document.
2. A new field was added under the name Staff name to distinguish between the seven different excel documents.
3. To reduce the size of the document All the fields that are empty are removed, such as the ones related to the chemical control information.
4. It has been noticed that the Date of the survey fields are identical for the different pest, therefore only one field is kept and the rest are removed.
5. The field name is so long and have characteristics such as (% spaces) which do not compatible with ArcGIS format, thus the field name was modified to fit the table format requirement in ArcGIS software.
6. In the fields that represent the infestation ratio (%) the record format category is percentage and this is not compatible with ArcGIS, thus the category was changed to number. Then the formula in this fields are modified to give the correct value, finally the value of the formulas was copied and pasted as values.
7. The records with no Long and Lat information was removed from the table, because the ArcGIS give the empty records with number category value of 0 and the point will appear in wrong location with Long 0 and Lat 0.

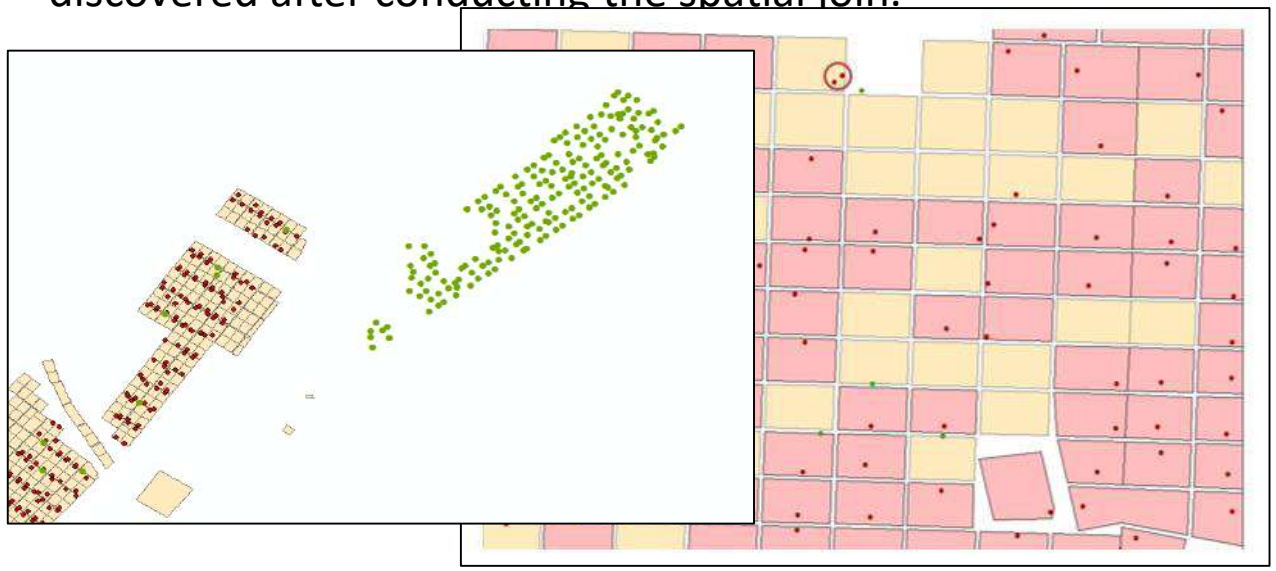
The final Al Khattem data table with 1172 records was converted to point shapefile in ArcGIS, by using the decimal degree Long Lat coordinate. WGS 1984 Geographic Coordinate System was specified for the new shapefile.

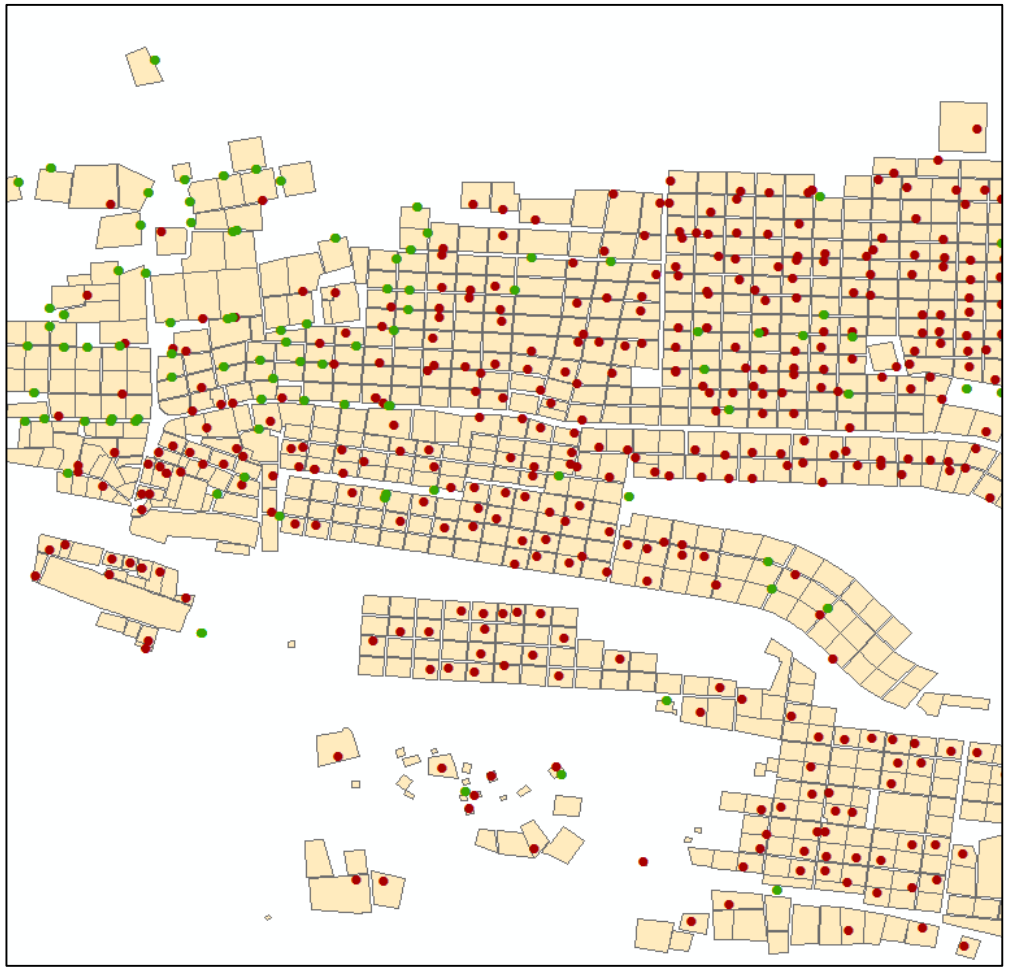
The same step was done on the final Rahba data table with 1866 records.



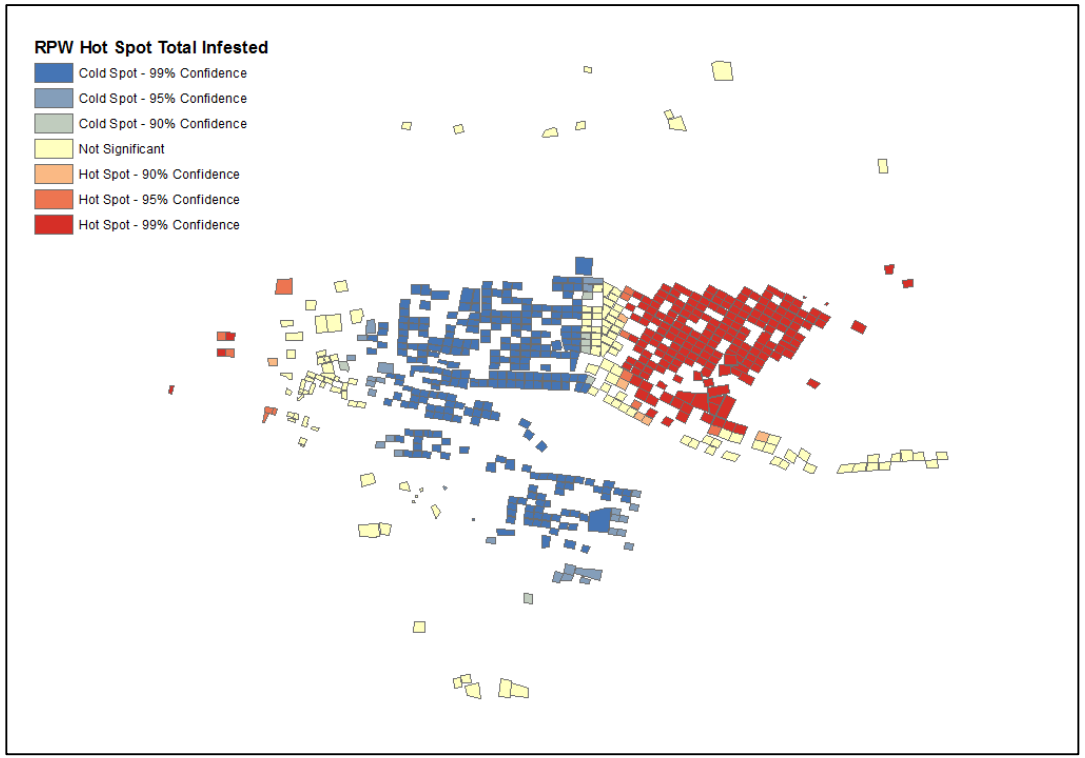
	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	
1	FD_sub_Area	FD_Longitude	FD_Latitude	RPW_Infested	RPW_Survey	RPW_Infe_Ratio	SB_Infested	SB_Survey	SB_Infe_Ratio	StB_Infested	StB_Survey	StB_Inf
2	شرق	55.102043	24.182013		14-Feb-16	0.00	4	14-Feb-16	4.00	27	14-Feb-16	
3	شرق	55.100675	24.184705		14-Feb-16	0.00	6	14-Feb-16	3.00	11	14-Feb-16	
4	شرق				14-Feb-16	0.00	14	14-Feb-16	3.50	20	14-Feb-16	
5	شرق				15-Feb-16	0.00	52	15-Feb-16	21.49	8	15-Feb-16	
6	شرق	55.097813	24.184095		10-Mar-16	0.00	10	10-Mar-16	6.67	2	10-Mar-16	
7	شرق	55.094622	24.184433		10-Mar-16	0.00	38	10-Mar-16	14.07	17	10-Mar-16	
8	شرق	55.095027	24.182997		16-Feb-16	0.00	46	16-Feb-16	22.33	4	16-Feb-16	
9	شرق	55.024261	24.205120		1-Mar-16	0.00	92	1-Mar-16	71.88	5	1-Mar-16	
10	شرق	55.091473	24.184247		10-Mar-16	0.00	19	10-Mar-16	31.67	7	10-Mar-16	
11	شرق	55.093743	24.183648		16-Feb-16	0.00	56	16-Feb-16	25.45	2	16-Feb-16	
12	شرق	55.091177	24.182563		16-Feb-16	0.00	39	16-Feb-16	19.50	28	16-Feb-16	
13	شرق	55.090032	24.182642		19-Mar-16	0.00	88	19-Mar-16	58.67	18	19-Mar-16	
14	شرق	55.089572	24.184240		16-Feb-16	0.00	16	16-Feb-16	10.67		16-Feb-16	
15	غرب	55.087367	24.184157		17-Feb-16	0.00	18	17-Feb-16	8.18	9	17-Feb-16	
16	غرب	55.087352	24.182058		10-Mar-16	0.00	42	10-Mar-16	28.00	8	10-Mar-16	
17	غرب	55.085885	24.183773		17-Feb-16	0.00	69	17-Feb-16	49.29	12	17-Feb-16	
18	غرب	55.084473	24.181980		18-Feb-16	0.00	38	18-Feb-16	10.56	2	18-Feb-16	
19	غرب	55.083615	24.183500		18-Feb-16	0.00	26	18-Feb-16	37.14	19	18-Feb-16	
20	غرب	55.083198	24.182107		21-Feb-16	0.00	75	21-Feb-16	57.69	18	21-Feb-16	
21	غرب				10-Mar-16	#DIV/0!		10-Mar-16	#DIV/0!	0	10-Mar-16	#D

Sines the attribute data in the GIS software is held in Relational systems there should be a matching filed to perform a join between the survey table and the boundary shapefile. The data do not contain such field therefore each point of the field survey was matched to it corresponding field boundary, by spatially Joining the points to the field that it falls inside of it, this step was done in ArcGIS. Several errors in the source data was discovered after conducting the spatial join.





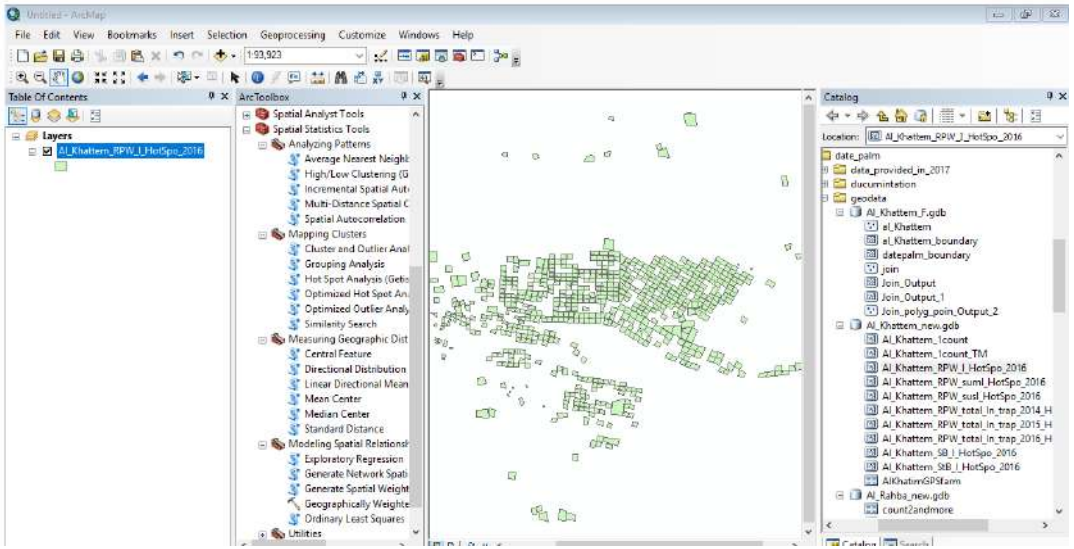
	missing farm GPS coordinates
	GPS coordinates outside the farm boundary
	missing data
	two GPS coordinates falls in the same farm boundary
	Three GPS coordinates falls in the same farm boundary
	Four GPS coordinates falls in the same farm boundary
	Five GPS coordinates falls in the same farm boundary
	Six GPS coordinates falls in the same farm boundary
	Seven GPS coordinates falls in the same farm boundary
	GPS coordinates exist but the farm boundary is missing
please cor	rect information in column W or column Z



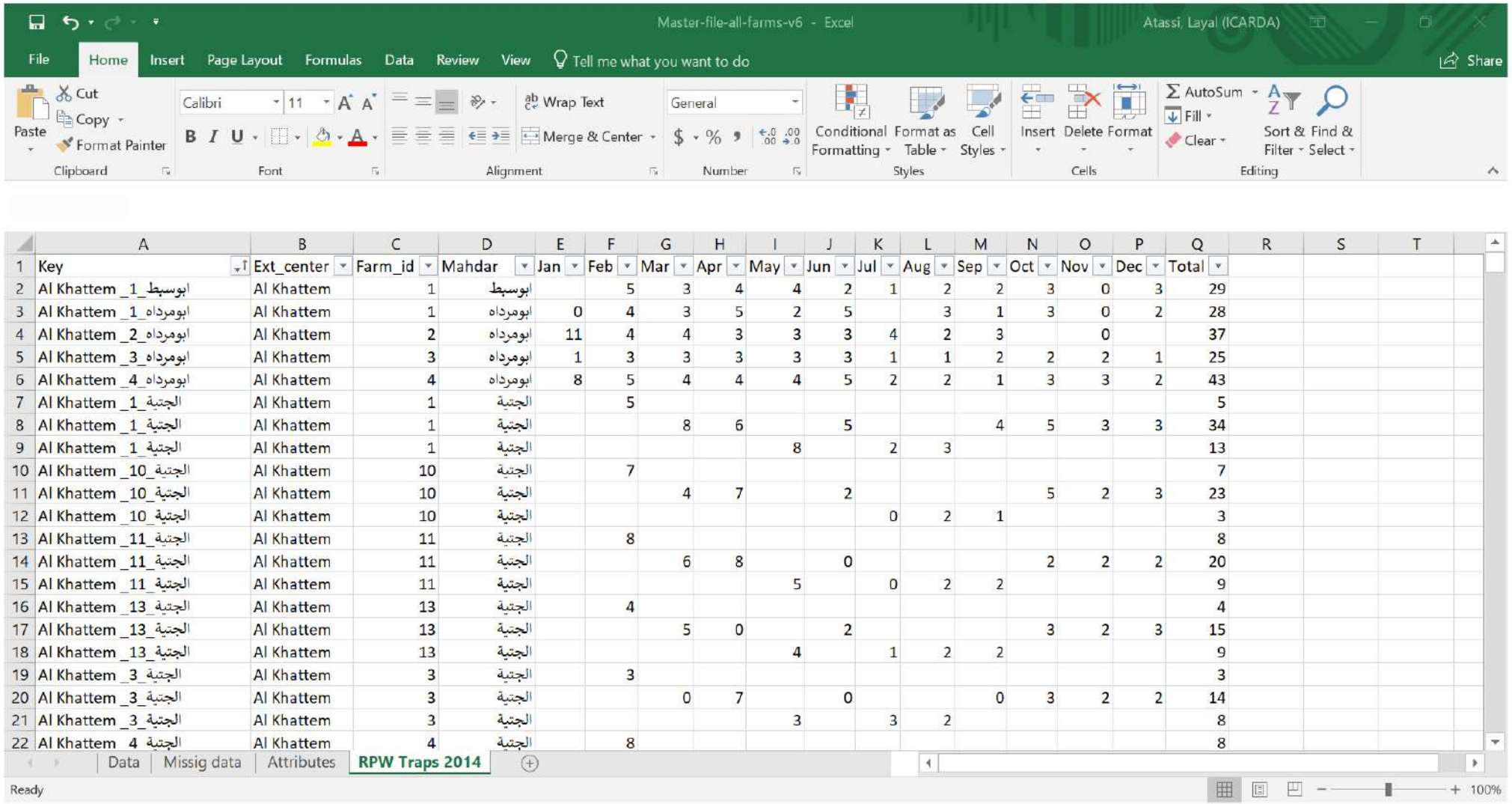
shows the Total RPW Infestation Ratio **Hotspot for** Al_Khattem

WGS_1984_Dubai_Local_TM (Transverse_Mercator)

Null values



Trap data

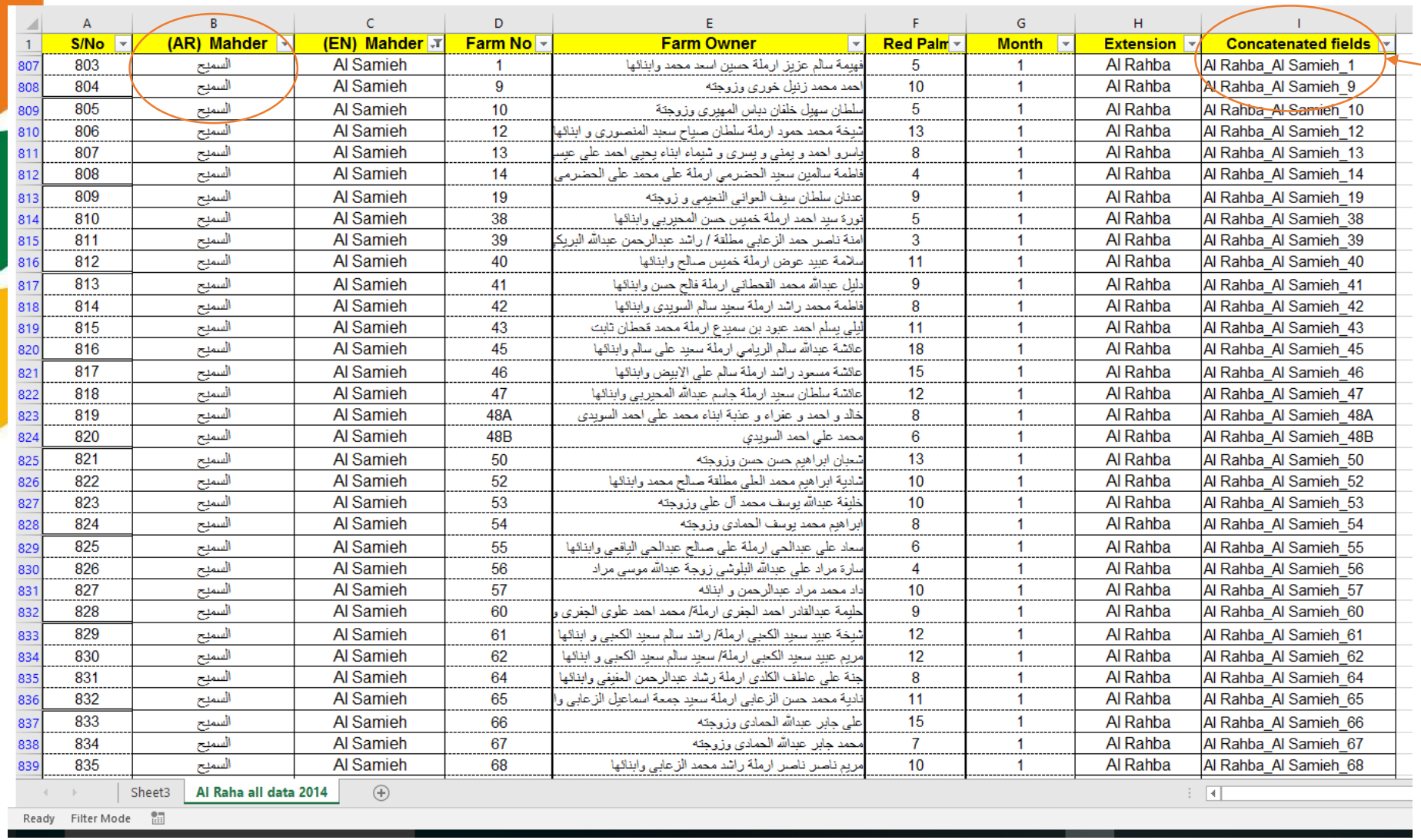


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Key	Ext_center	Farm_id	Mahdar	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total			
2	Al Khattem _1_ابوسبط	Al Khattem	1	ابوسبط		5	3	4	4	2	1	2	2	3	0	3	29			
3	Al Khattem _1_ابومرداه	Al Khattem	1	ابومرداه	0	4	3	5	2	5		3	1	3	0	2	28			
4	Al Khattem _2_ابومرداه	Al Khattem	2	ابومرداه	11	4	4	3	3	3	4	2	3		0		37			
5	Al Khattem _3_ابومرداه	Al Khattem	3	ابومرداه	1	3	3	3	3	3	1	1	2	2	2	1	25			
6	Al Khattem _4_ابومرداه	Al Khattem	4	ابومرداه	8	5	4	4	4	5	2	2	1	3	3	2	43			
7	Al Khattem _1_الجتية	Al Khattem	1	الجتية		5											5			
8	Al Khattem _1_الجتية	Al Khattem	1	الجتية			8	6		5			4	5	3	3	34			
9	Al Khattem _1_الجتية	Al Khattem	1	الجتية					8		2	3					13			
10	Al Khattem _10_الجتية	Al Khattem	10	الجتية		7											7			
11	Al Khattem _10_الجتية	Al Khattem	10	الجتية			4	7		2				5	2	3	23			
12	Al Khattem _10_الجتية	Al Khattem	10	الجتية							0	2	1				3			
13	Al Khattem _11_الجتية	Al Khattem	11	الجتية		8											8			
14	Al Khattem _11_الجتية	Al Khattem	11	الجتية			6	8		0				2	2	2	20			
15	Al Khattem _11_الجتية	Al Khattem	11	الجتية					5		0	2	2				9			
16	Al Khattem _13_الجتية	Al Khattem	13	الجتية		4											4			
17	Al Khattem _13_الجتية	Al Khattem	13	الجتية			5	0		2				3	2	3	15			
18	Al Khattem _13_الجتية	Al Khattem	13	الجتية					4		1	2	2				9			
19	Al Khattem _3_الجتية	Al Khattem	3	الجتية		3											3			
20	Al Khattem _3_الجتية	Al Khattem	3	الجتية			0	7		0			0	3	2	2	14			
21	Al Khattem _3_الجتية	Al Khattem	3	الجتية					3		3	2					8			
22	Al Khattem _4_الجتية	Al Khattem	4	الجتية		8											8			

Issues in the RPW data trap data

	A	B	C	D	E	F	G	H	I	J
1	S/No	(AR) Mahder	(EN) Mahder	Farm No	Farm Owner	Red Palm	Month	Extension	Concatenated fields	
1600	1596	بني ياس	Bani Yas	45		3	1	Al Rahba	Al Rahba_Bani Yas_45	
3294	1630	بني ياس	Bani Yas	45		15	2	Al Rahba	Al Rahba_Bani Yas_45	
5010	1615	بني ياس	Bani Yas	45		6	3	Al Rahba	Al Rahba_Bani Yas_45	
6521	1411	بني ياس	Bani Yas	45		6	4	Al Rahba	Al Rahba_Bani Yas_45	
8020	1411	بني ياس	Bani Yas	45		6	4	Al Rahba	Al Rahba_Bani Yas_45	
9798	1690	بني ياس	Bani Yas	45		4	5	Al Rahba	Al Rahba_Bani Yas_45	
11550	1645	بني ياس	Bani Yas	45		8	6	Al Rahba	Al Rahba_Bani Yas_45	
14860	1645	بني ياس	Bani Yas	45		0	8	Al Rahba	Al Rahba_Bani Yas_45	
16582	1628	بني ياس	Bani Yas	45		4	9	Al Rahba	Al Rahba_Bani Yas_45	
20051	1644	بني ياس	Bani Yas	45		5	11	Al Rahba	Al Rahba_Bani Yas_45	
21763	1618	بني ياس	Bani Yas	45		3	12	Al Rahba	Al Rahba_Bani Yas_45	
21861										

1. The record for April the fourth month of the year is duplicate for each owner, the duplicate rows should be removed.



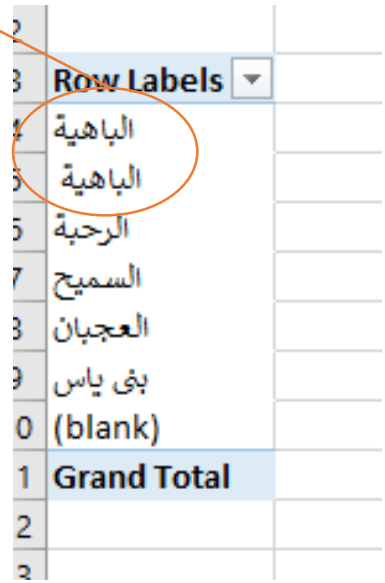
	A	B	C	D	E	F	G	H	I
1	S/No	(AR) Mahder	(EN) Mahder	Farm No	Farm Owner	Red Palm	Month	Extension	Concatenated fields
807	803	السميح	Al Samieh	1	فهيمة سالم عزيز ارملة حسين اسعد محمد وابنائها	5	1	Al Rahba	Al Rahba_Al Samieh_1
808	804	السميح	Al Samieh	9	احمد محمد زنيل خوري وزوجته	10	1	Al Rahba	Al Rahba_Al Samieh_9
809	805	السميح	Al Samieh	10	سلطان سهيل خلفان دياس المهيري وزوجتة	5	1	Al Rahba	Al Rahba_Al Samieh_10
810	806	السميح	Al Samieh	12	شيخة محمد حمود ارملة سلطان صياح سعيد المنصوري و ابنائها	13	1	Al Rahba	Al Rahba_Al Samieh_12
811	807	السميح	Al Samieh	13	ياسرو احمد و يمني و يسرى و شيماء ابناء يحيى احمد علي عيس	8	1	Al Rahba	Al Rahba_Al Samieh_13
812	808	السميح	Al Samieh	14	فاطمة سالمين سعيد الحضرمي ارملة علي محمد علي الحضرمي	4	1	Al Rahba	Al Rahba_Al Samieh_14
813	809	السميح	Al Samieh	19	عدنان سلطان سيف العواني النعيمي و زوجته	9	1	Al Rahba	Al Rahba_Al Samieh_19
814	810	السميح	Al Samieh	38	نورة سيد احمد ارملة خميس حسن المحيربي وابنائها	5	1	Al Rahba	Al Rahba_Al Samieh_38
815	811	السميح	Al Samieh	39	امنة ناصر حمد الزعابي مطلقة / راشد عبدالرحمن عبدالله البريكي	3	1	Al Rahba	Al Rahba_Al Samieh_39
816	812	السميح	Al Samieh	40	سلامة عبيد عوض ارملة خميس صالح وابنائها	11	1	Al Rahba	Al Rahba_Al Samieh_40
817	813	السميح	Al Samieh	41	دليل عبدالله محمد القحطاني ارملة فالح حسن وابنائها	9	1	Al Rahba	Al Rahba_Al Samieh_41
818	814	السميح	Al Samieh	42	فاطمة محمد راشد ارملة سعيد سالم السويدي وابنائها	8	1	Al Rahba	Al Rahba_Al Samieh_42
819	815	السميح	Al Samieh	43	ليلي يسلم احمد عبود بن سميدع ارملة محمد قحطان ثابت	11	1	Al Rahba	Al Rahba_Al Samieh_43
820	816	السميح	Al Samieh	45	عائشة عبدالله سالم الريامي ارملة سعيد علي سالم وابنائها	18	1	Al Rahba	Al Rahba_Al Samieh_45
821	817	السميح	Al Samieh	46	عائشة مسعود راشد ارملة سالم علي الابيض وابنائها	15	1	Al Rahba	Al Rahba_Al Samieh_46
822	818	السميح	Al Samieh	47	عائشة سلطان سعيد ارملة جاسم عبدالله المحيربي وابنائها	12	1	Al Rahba	Al Rahba_Al Samieh_47
823	819	السميح	Al Samieh	48A	خالد و احمد و عفراء و عذبة ابناء محمد علي احمد السويدي	8	1	Al Rahba	Al Rahba_Al Samieh_48A
824	820	السميح	Al Samieh	48B	محمد علي احمد السويدي	6	1	Al Rahba	Al Rahba_Al Samieh_48B
825	821	السميح	Al Samieh	50	شعبان ابراهيم حسن حسن وزوجته	13	1	Al Rahba	Al Rahba_Al Samieh_50
826	822	السميح	Al Samieh	52	شادية ابراهيم محمد العلي مطلقة صالح محمد وابنائها	10	1	Al Rahba	Al Rahba_Al Samieh_52
827	823	السميح	Al Samieh	53	خليفة عبدالله يوسف محمد آل علي وزوجته	10	1	Al Rahba	Al Rahba_Al Samieh_53
828	824	السميح	Al Samieh	54	ابراهيم محمد يوسف الحمادي وزوجته	8	1	Al Rahba	Al Rahba_Al Samieh_54
829	825	السميح	Al Samieh	55	سعاد علي عبدالحي ارملة علي صالح عبدالحي الياقعي وابنائها	6	1	Al Rahba	Al Rahba_Al Samieh_55
830	826	السميح	Al Samieh	56	سارة مراد علي عبدالله البلوشي زوجة عبدالله موسى مراد	4	1	Al Rahba	Al Rahba_Al Samieh_56
831	827	السميح	Al Samieh	57	داد محمد مراد عبدالرحمن و ابنائه	10	1	Al Rahba	Al Rahba_Al Samieh_57
832	828	السميح	Al Samieh	60	حليمة عبدالقادر احمد الجفري ارملة/ محمد احمد علوى الجفرى و	9	1	Al Rahba	Al Rahba_Al Samieh_60
833	829	السميح	Al Samieh	61	شيخة عبيد سعيد الكعبي ارملة/ راشد سالم سعيد الكعبي و ابنائها	12	1	Al Rahba	Al Rahba_Al Samieh_61
834	830	السميح	Al Samieh	62	مريم عبيد سعيد الكعبي ارملة/ سعيد سالم سعيد الكعبي و ابنائها	12	1	Al Rahba	Al Rahba_Al Samieh_62
835	831	السميح	Al Samieh	64	جنة علي عاطف الكلدى ارملة رشاد عبدالرحمن العفيفي وابنائها	8	1	Al Rahba	Al Rahba_Al Samieh_64
836	832	السميح	Al Samieh	65	نادية محمد حسن الزعابي ارملة سعيد جمعة اسماعيل الزعابي وا	11	1	Al Rahba	Al Rahba_Al Samieh_65
837	833	السميح	Al Samieh	66	علي جابر عبدالله الحمادي وزوجته	15	1	Al Rahba	Al Rahba_Al Samieh_66
838	834	السميح	Al Samieh	67	محمد جابر عبدالله الحمادي وزوجته	7	1	Al Rahba	Al Rahba_Al Samieh_67
839	835	السميح	Al Samieh	68	مريم ناصر ناصر ارملة راشد محمد الزعابي وابنائها	10	1	Al Rahba	Al Rahba_Al Samieh_68

Sheet3 | Al Raha all data 2014

Ready | Filter Mode

2. For the concatenated (unique farm identifier)
The Sub Region/Mahdar should be the Arabic name
To link with master file records.

3. Note the leading and trailing spaces in (AR)Mahder should be Trimmed first.



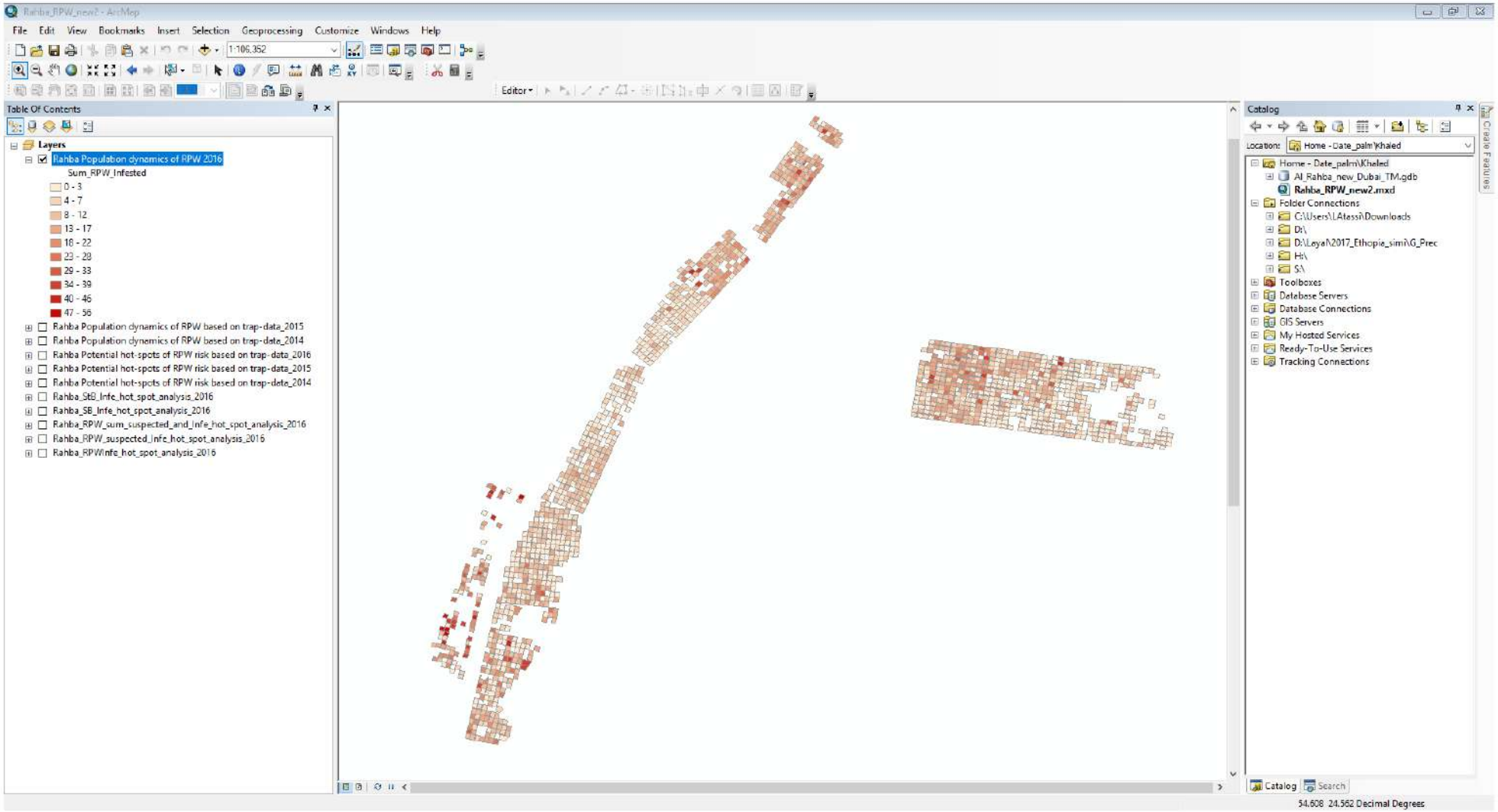
	A	B	C	D	E	F	G	H	I	J
1	S/No	(AR) Mahder	(EN) Mahder	Farm No	Farm Owner	Red Palm	Month	Extension	Concatenated fields	
967	966	العجبان	Al Ajban	5	[redacted]	15	1	Al Rahba	Al Rahba_Al Ajban_5	
2654	993	العجبان	Al Ajban	5		6	2	Al Rahba	Al Rahba_Al Ajban_5	
4371	979	العجبان	Al Ajban	5		5	3	Al Rahba	Al Rahba_Al Ajban_5	
5895	788	العجبان	Al Ajban	5		11	4	Al Rahba	Al Rahba_Al Ajban_5	
7394	788	العجبان	Al Ajban	5		11	4	Al Rahba	Al Rahba_Al Ajban_5	
9134	1029	العجبان	Al Ajban	5		4	5	Al Rahba	Al Rahba_Al Ajban_5	
10915	1013	العجبان	Al Ajban	5		7	6	Al Rahba	Al Rahba_Al Ajban_5	
14222	1010	العجبان	Al Ajban	5		3	8	Al Rahba	Al Rahba_Al Ajban_5	
15940	989	العجبان	Al Ajban	5		3	9	Al Rahba	Al Rahba_Al Ajban_5	
17674	1005	العجبان	Al Ajban	5		3	10	Al Rahba	Al Rahba_Al Ajban_5	
19396	992	العجبان	Al Ajban	5		5	11	Al Rahba	Al Rahba_Al Ajban_5	
21121	979	العجبان	Al Ajban	5		3	12	Al Rahba	Al Rahba_Al Ajban_5	
21858										

4. For data integrity please check that any farm in each Mahder has same owner.
Like in Al Ajban farms (5, 77, 153, 162, 168, 201, 211, 244, 298, 320, 416, 508, 695, 224A)
In Al Rahba farms (113, 215, 225, 249, 252, 254, 255, 259, 262, 263, 264, 274, 299, 433, 446, 455, 461, 469, 470, 477, 497, 502, 579, 593, 681, 710, 785, 827, 845, 869, 887, 901, 961)
In Al Samieh farms (124, 207, 225, 227, 229, 238, 246)
And in Bani Yas (26 and 52).

Such cases may refer to serious issues like miss tag farm Mahder or number.

	(EN) Mahder	Al Rahba													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	Count of Month														
	Row Labels													(blank)	Grand Total
157	155		1	1	1	2	1	1	1	1	1	2	1	1	14 oops
169	167					2	1	1		1	1	2	1	1	10 oops
221	222		1	1	1	2	1	1	1	1	1	2	1	1	14 oops
224	225		1	1	1	2	1	1	1	2	1	2	1	1	15 oops
240	242		1	1	1	2	1	2		1			1		10 oops
247	249			1	1	2	1	2	1		1		1	1	11 oops
253	255		1	1	1	2	1	2	1	1	1	1	1	1	14 oops
261	264		1	1	1	2	1	2	1	1	1	1	1	1	14 oops
436	446		1	1	1	2	1			1	2	1			10 oops
458	470		1							2					3 oops
465	477					2				2				1	5 oops
485	497		1	1	1	2	1	1	1	2	1	1		1	13 oops
490	502						1	1	1	2				1	6 oops
543	579		1	1	1	2	1	1	1	3	1	1	1	1	15 oops
692	778		1	1	1	2	1	1	1	1	2	1	1		13 oops
694	780		1	1	1		1	1	1	1	1	1	2	1	12 oops
793	886		1	1	1		1	1	1	2					8 oops
868	961		1	1	1		1	1		1		1	2		9 oops
939	**Grand Total**		**802**	**809**	**792**	**1378**	**830**	**835**	**700**	**850**	**807**	**810**	**808**	**797**	**10218** oops
1986															

5. Check and remove duplicate visits records for the same farm in the same month highlighted in the above screenshot
For Al Rahba, other cases in Al Ajban includes farms (168, 416, 695) and in Al Samieh includes farms (124, 227)


Rahba_RPW_new2 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
Table Of Contents
Layers
Rahba Population dynamics of RPW 2016
Sum_RPW_Infested
0 - 3
4 - 7
8 - 12
13 - 17
18 - 22
23 - 28
29 - 33
34 - 39
40 - 46
47 - 56
Rahba Population dynamics of RPW based on trap-data_2015
Rahba Population dynamics of RPW based on trap-data_2014
Rahba Potential hot-spots of RPW risk based on trap-data_2016
Rahba Potential hot-spots of RPW risk based on trap-data_2015
Rahba Potential hot-spots of RPW risk based on trap-dete_2014
Rahba_StB_Infe_hot_spot_analysis_2016
Rahba_SB_Infe_hot_spot_analysis_2016
Rahba_RPW_sum_suspected_and_Infe_hot_spot_analysis_2016
Rahba_RPW_suspected_Infe_hot_spot_analysis_2016
Rahba_RPWInfe_hot_spot_analysis_2016
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Rahba_RPW_new2.mxd
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D:\
D:\Leya\2017_Ethopia_simi\G_Prec
H:\
S:\
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Database Servers
Database Connections
GIS Servers
My Hosted Services
Ready-To-Use Services
Tracking Connections
Catalog
Search
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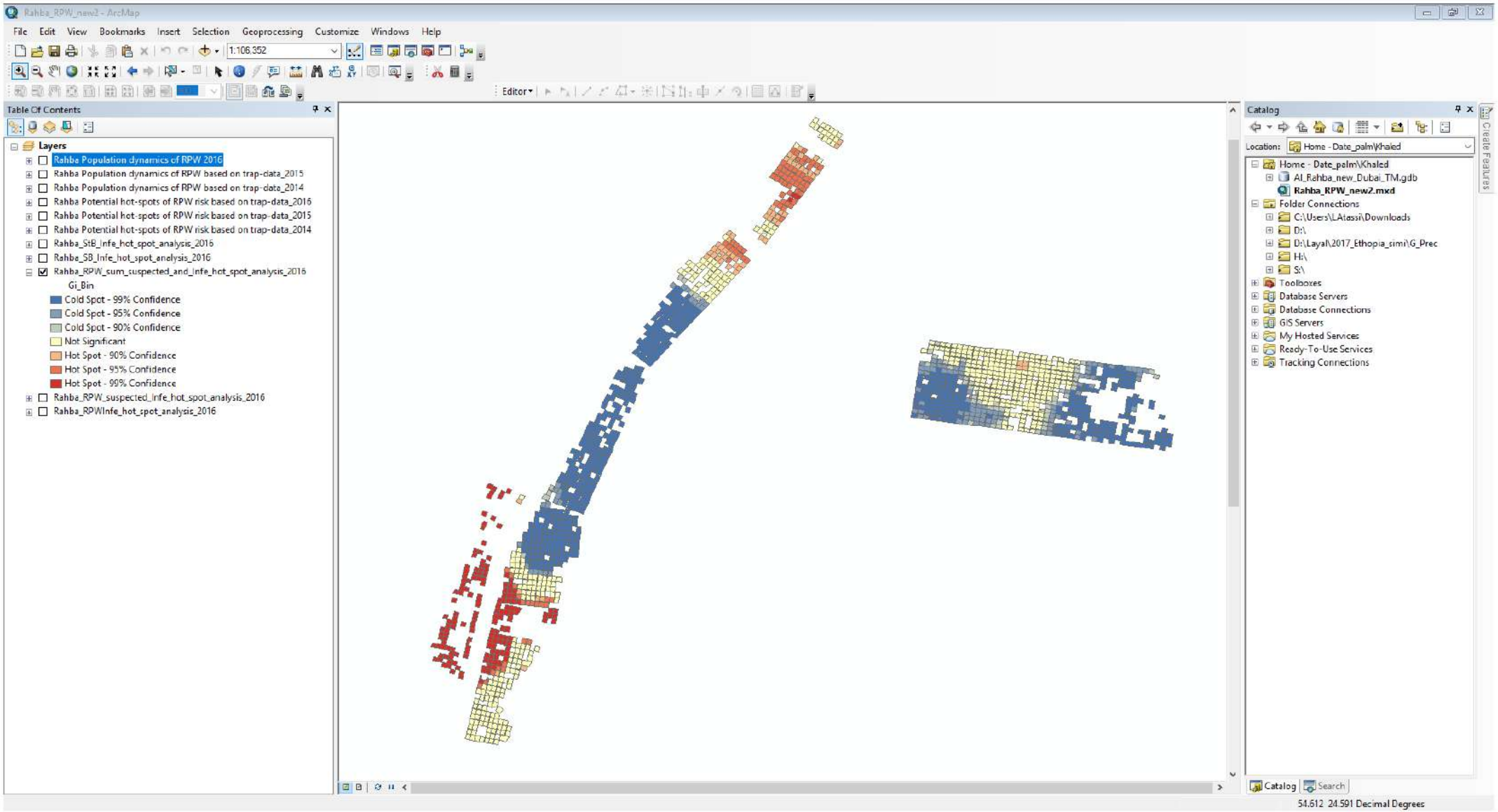
Rahba_RPW_new2 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
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Editor
Table Of Contents
Layers
Rahba Population dynamics of RPW 2016
Rahba Population dynamics of RPW based on trap-data_2015
Rahba Population dynamics of RPW based on trap-data_2014
Rahba Potential hot-spots of RPW risk based on trap-data_2016
Rahba Potential hot-spots of RPW risk based on trap-data_2015
Rahba Potential hot-spots of RPW risk based on trap-data_2014
Rahba_StB_Infe_hot_spot_analysis_2016
Rahba_SB_Infe_hot_spot_analysis_2016
Rahba_RPW_sum_suspected_and_Infe_hot_spot_analysis_2016
Gi_Bin
Cold Spot - 99% Confidence
Cold Spot - 95% Confidence
Cold Spot - 90% Confidence
Not Significant
Hot Spot - 90% Confidence
Hot Spot - 95% Confidence
Hot Spot - 99% Confidence
Rahba_RPW_suspected_Infe_hot_spot_analysis_2016
Rahba_RPWInfe_hot_spot_analysis_2016
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H:\
S:\
Toolboxes
Database Servers
Database Connections
GIS Servers
My Hosted Services
Ready-To-Use Services
Tracking Connections
Catalog
Search
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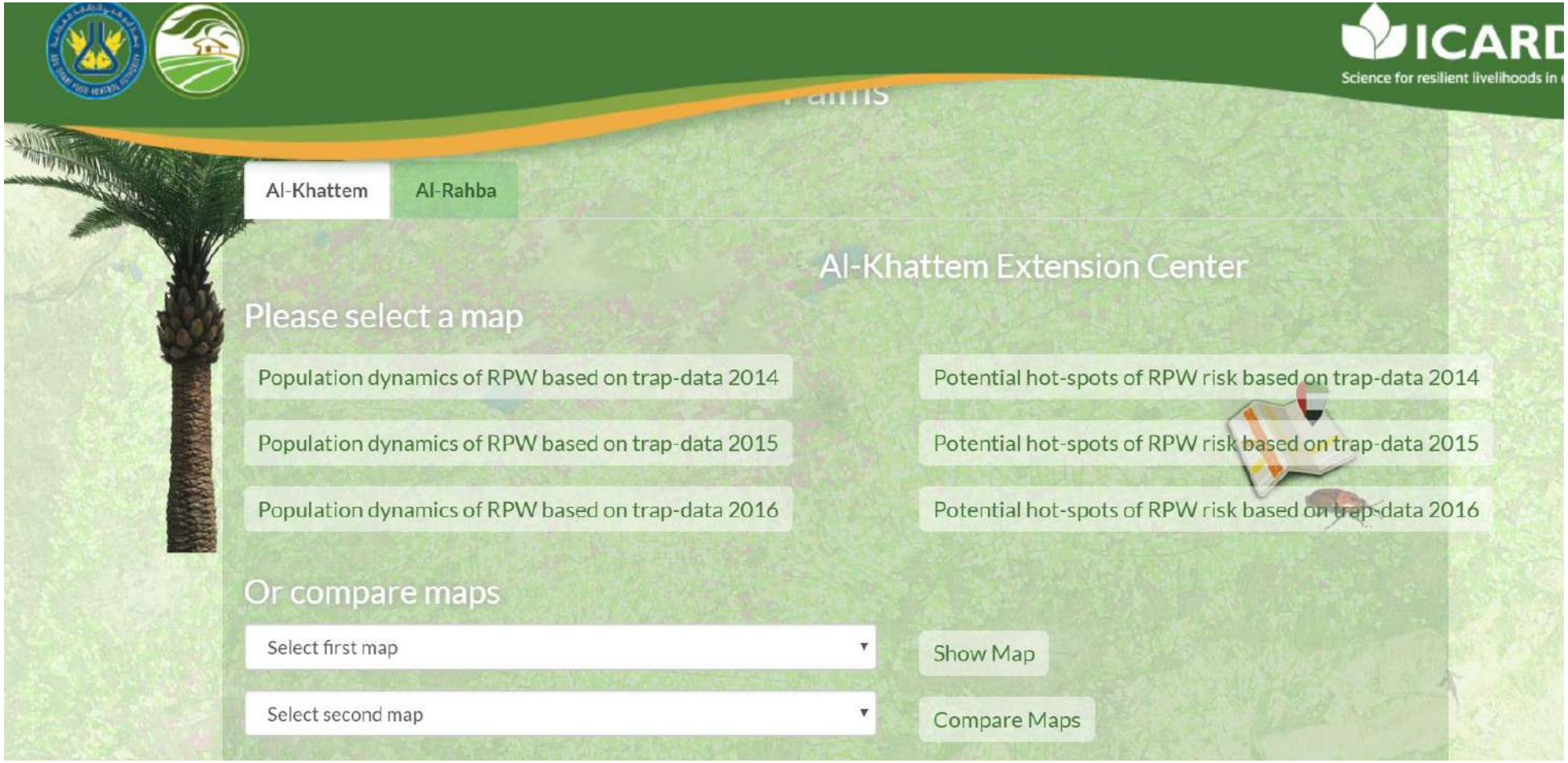
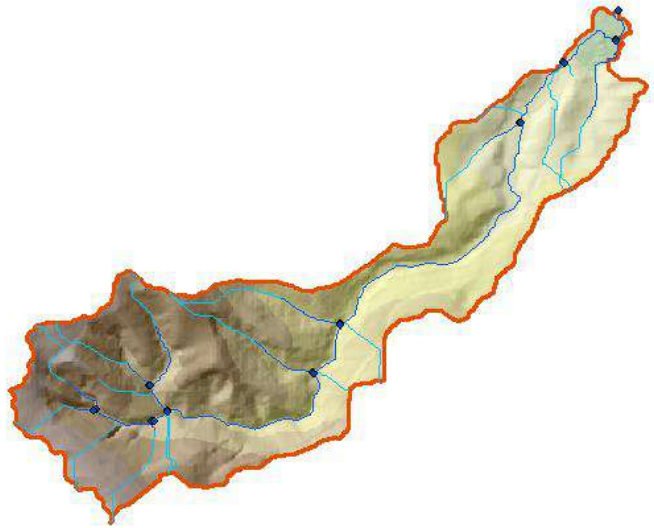
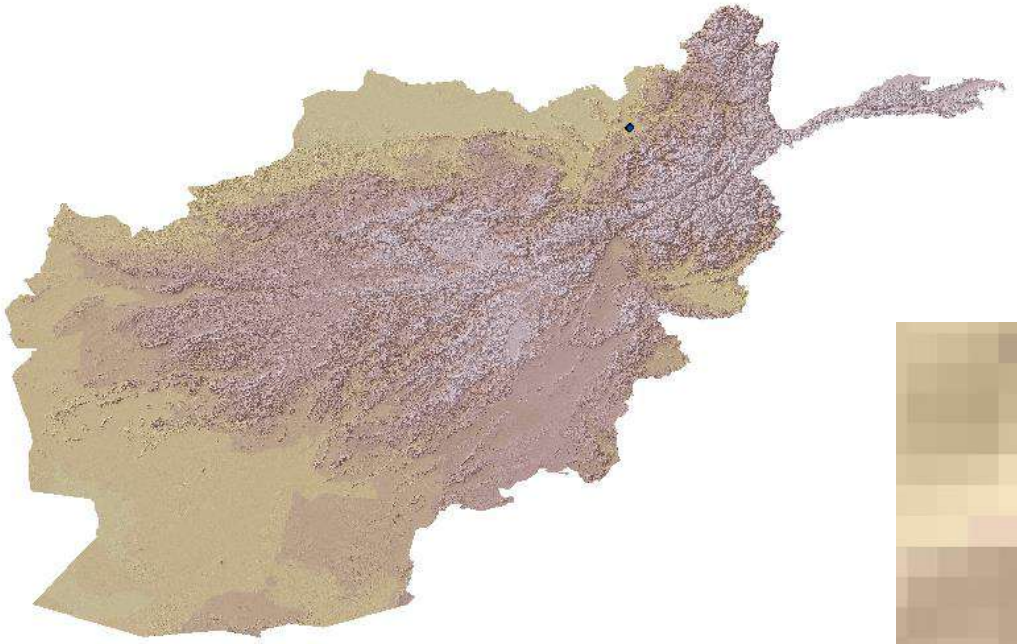
http://geoagro.icarda.org/datepalm/

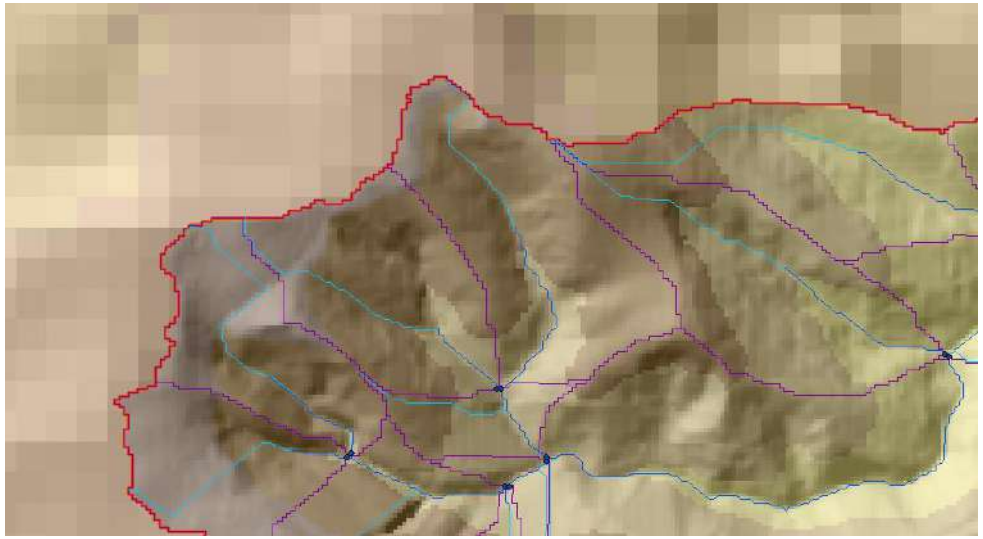


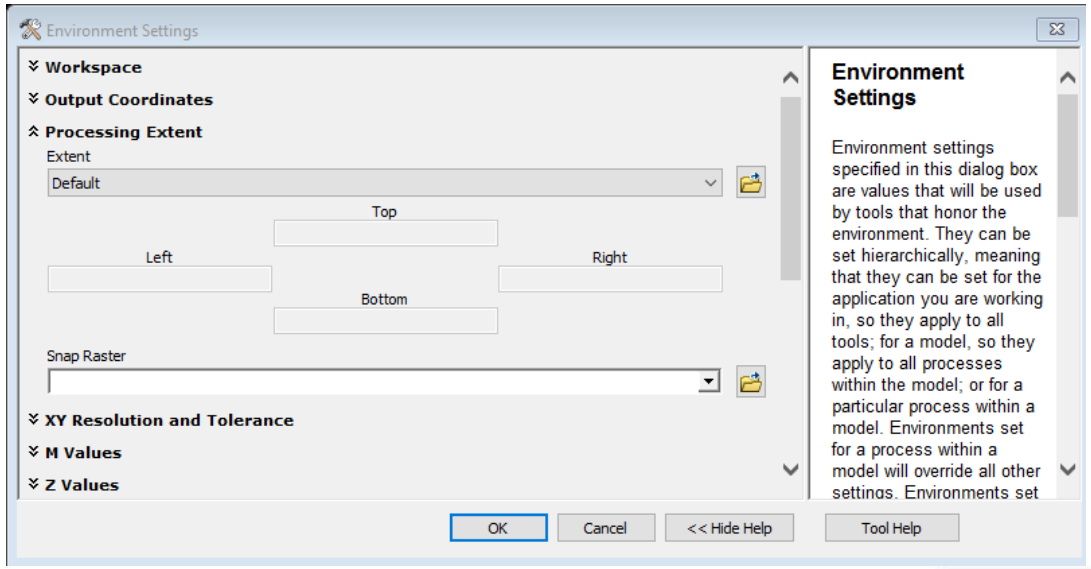
Raster data:
Spatial resolution and scale is a way for quality assurance

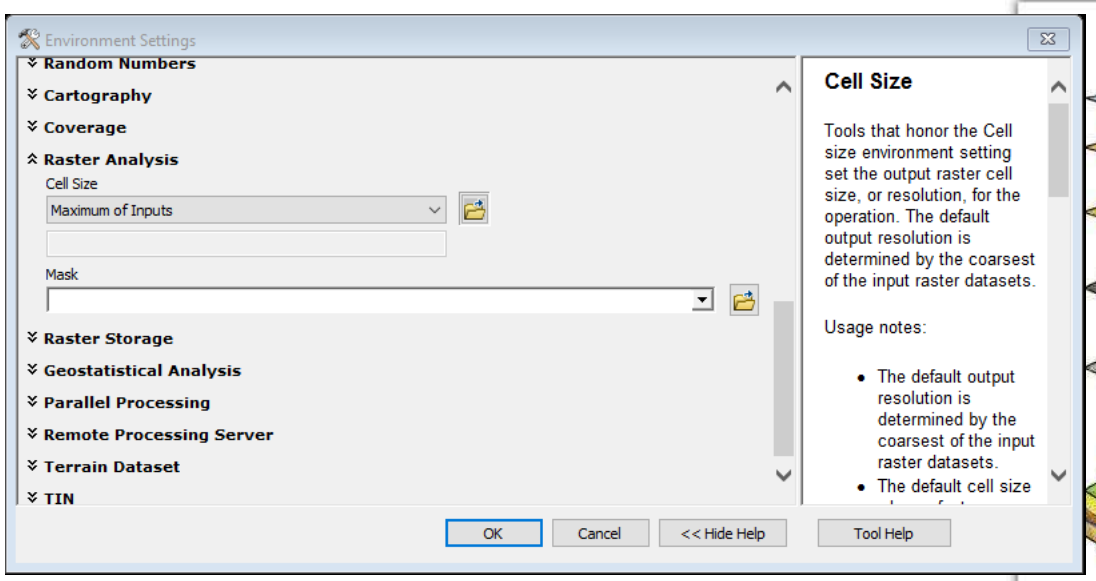
Fitting for purpose

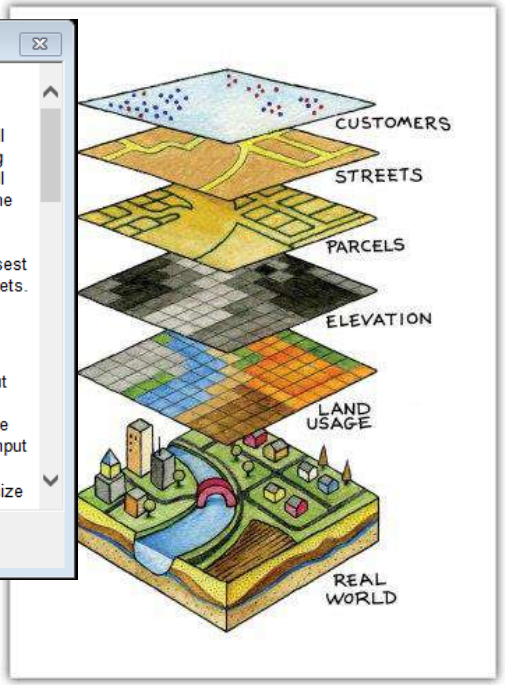


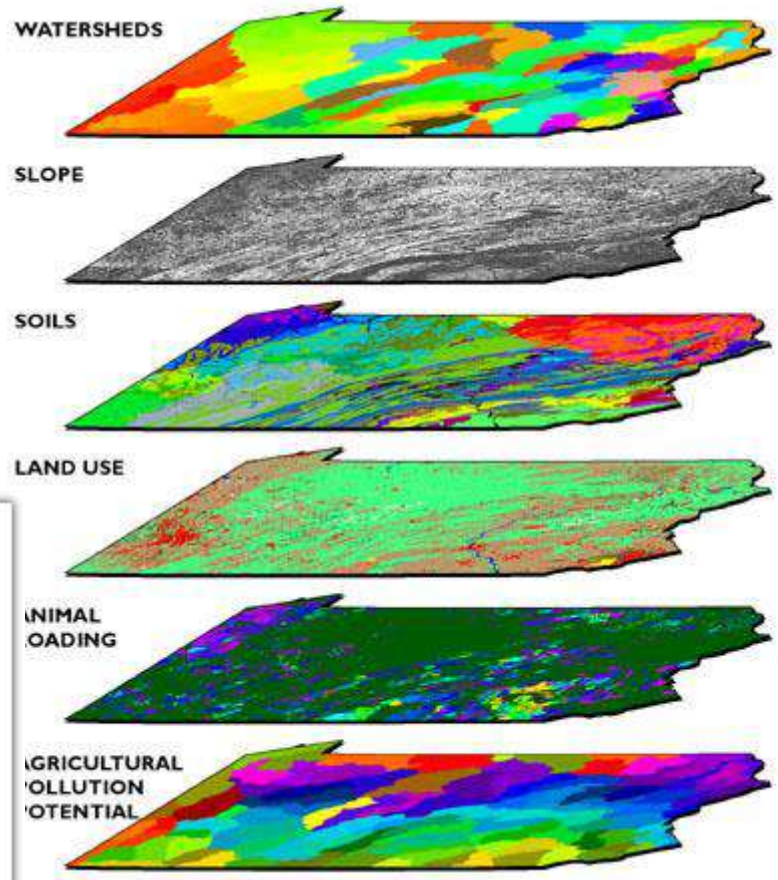






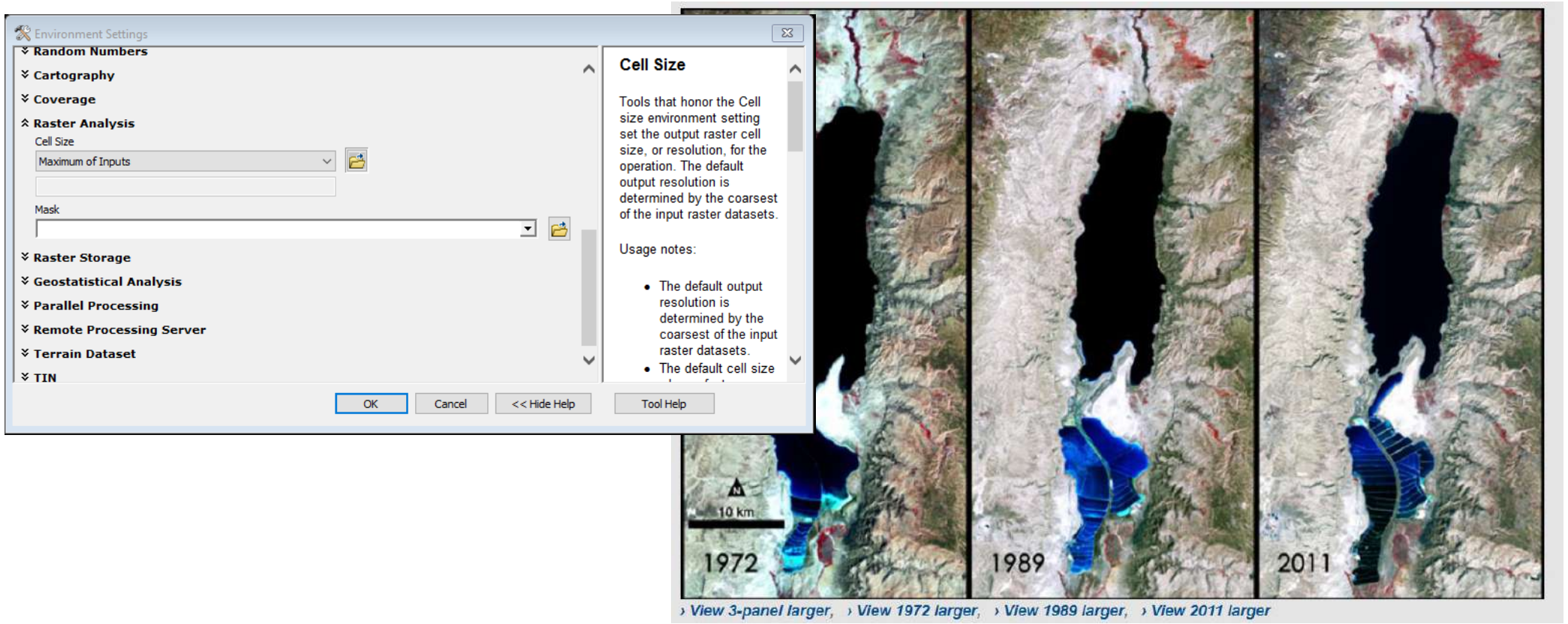






https://www.e-education.psu.edu/natureofgeoinfo/c9_p6.html

Temporal analyzing and identifying pattern



https://www.nasa.gov/topics/earth/features/ancient-sea-salt.html

Thank You