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The role of Geographical Information Systems in support of State Water Cadastre on the example of Kashkadarya region, Uzbekistan

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ABSTRACT: Geographical Information Systems (GIS) based maps are vital important in water sector and its development plays a key role in modernizing water cadaster systems. Measuring and storing of any water related infrastructure will help to better recording of existing assets and proper management. GIS systems and tools are key instrument to automate processes in State Water Cadaster to increase functionality and information exchange in digital form which helps to handle easy analytical research and technical activities (Arshavir Avagyan, et al., 2014). The GIS data helps to easily understand water features in spatial view and attributive data can be regularly updated by local government officials.

KEY WORDS: GIS, Water Cadastre, digital data

I. INTRODUCTION

Last two – three decades a GIS being heavily involved in development of digital data and support to state water cadastre with the aim of increasing efficiency and future sustainability in recording of water related assets (Wolfgang, et al.). Digital data are base for creating of digital cadastral maps to make easy for decision makers for better understanding of the existing conditions in any given study area. According to the paper (Moha ELAYACHI, et al., 2014) the digital cadastral maps should be introduced with a detail information with attributes where map units can also clearly stored. This system is therefore required because of its accuracy and timely management of assets. The cadastral maps were prepared as analogue in the past and it is efficient management factor were very low due to its scale in paper view and difficulties in term of updating any single maps. Today, as information technologies are growing rapidly, there is a need for robust systems in recording, storing and manipulating of water related features in digital form. Kashkaarya region in the republic of Uzbekistan is one of the densely irrigated zone where water management requires proper data generation and wise management as digital form. Attributive data and digital maps can help to the region improving its capacity in development of proper water cadastre. This will help decision makers making timely decisions for future sustainability of existing infrastructures and objects in the region.

II. STUDY AREA

Kashkadarya Region is one of the province of the republic of Uzbekistan which is located in the south-eastern part of the country in the basin of the Kashkadarya river basin and on the western slopes of the Pamir-Alay mountains. This region borders with two central Asian country Tajikistan and Turkmenistan, and with other local provinces of Uzbekistan which are Samarqand, Bukhara and Surkhandarya. It covers an area of 28,400 km² (wikipedia). Water resources are mainly from Amudarya and Kashadarya rivers. There is water related infrastructures in both rivers and inner canals where water infrastructure is coordinated by state organizations. Below map shows location of study area and its districts coded with numbers which is typical image of cadastral maps.

- 1 Chirakchi District
- 2 Dehkanabad District
- 3 Guzar District
- 4 Kamashi District
- 5 Karshi District
- 6 Koson District
- 7 Kasby District
- 8 Kitob District
- 9 Myrishkor District
- 10 Muborak District
- 11 Nishon District
- 12 Shakhrisabz District
- 13 Yakkabog District

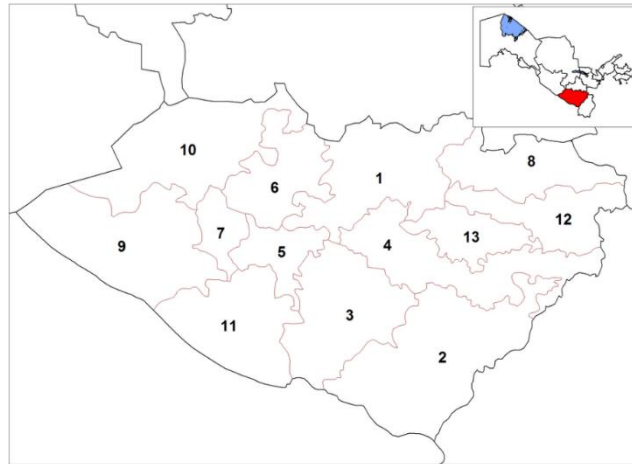


Fig.1. Study area (wikipedia)

III. DATA AND MATERIALS

Information related to water resources are collected from local government and they are classified according to feature types and its functionality. This information can be stored in digital form using GIS application to make them well classified and stored for visual interpretation and better management. This has to be done with a good design and with feature type orders. Below is a list of information for one sample feature collected and which needs to be well designed.

1. Karshi Main Canal (KMC)
2. Place of location
3. Water intake
4. Purpose of the canal
5. Capacity
6. Condition
7. Length
8. Construction #1
9. Operation start date
10. Under balance of
11. Inventarization date
12. Renovation date

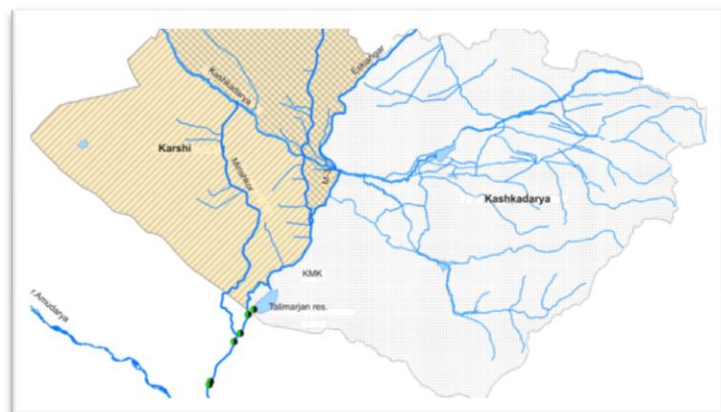


Fig.2. Location of Karshi main canal (CAWATERinfo)

Collected data given above are raw information which can be processed and designed to make this information a cadastral digital database for the decision makers and local government officials to establish a sustainable digital cadastral map information platform.

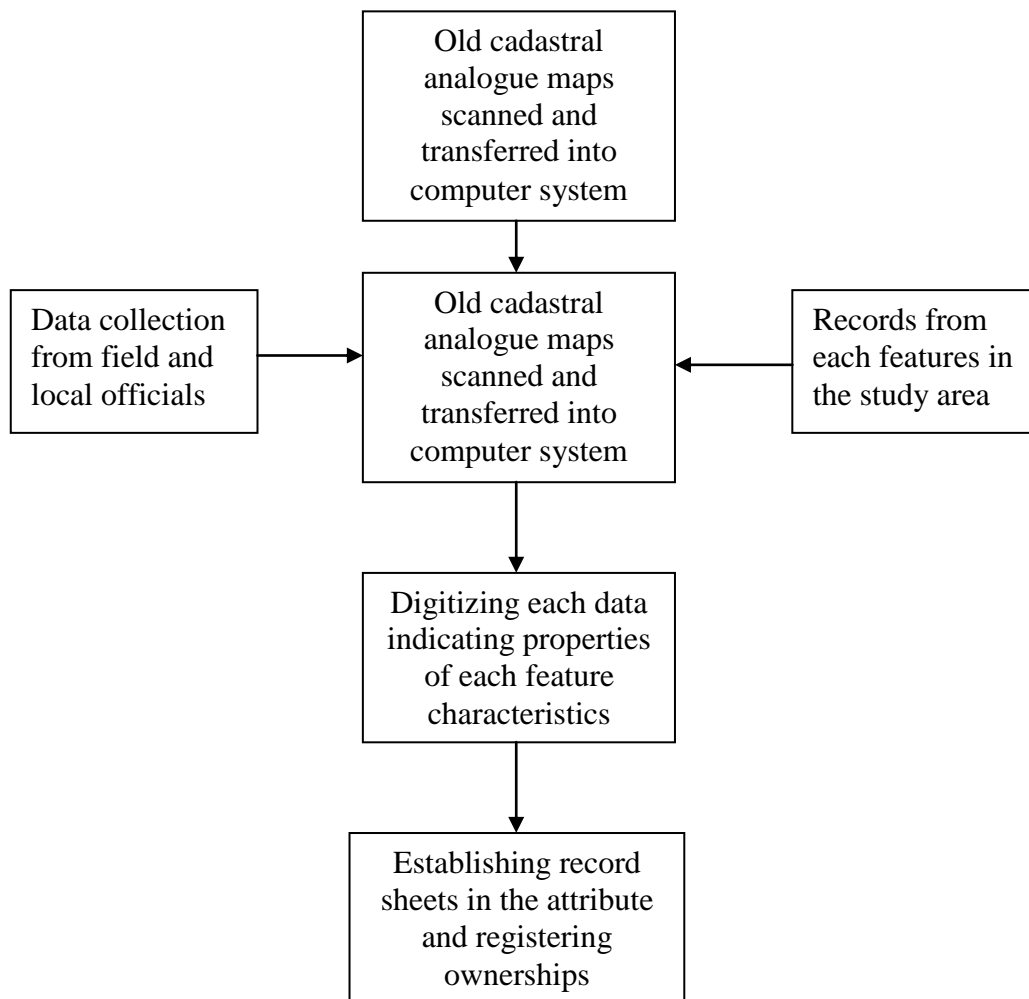
IV. METHODOLOGY

Although information related to any water related features are available, they have to be designed wisely so that recording, storing, manipulation and monitoring of any features should be easy and manageable. Therefore, GIS tool can be selected as a powerful application in digital cadastral mapping. This will allow representing all raw data in

meaningful way and easy to understanding of a particular asset. Each raw data has been classified and ordered based on their functions and role. There is mainly following water features:

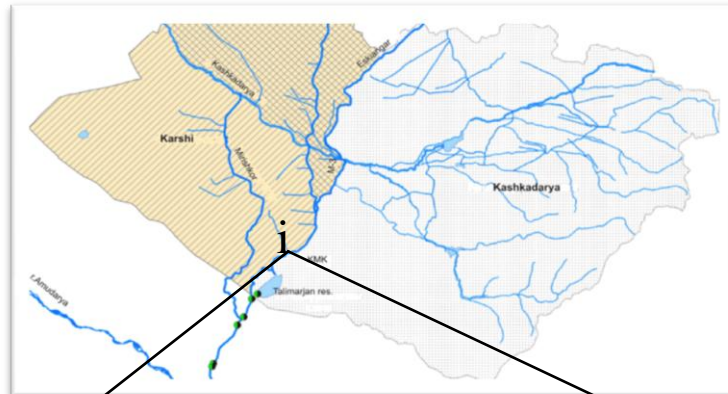
1. Main river
2. Main canal
3. Interfarm canals
4. Collector and drainages

In each features there are plenty of infrastructure which needs to be digitized and formed as digital cadastral maps.



V. EXPERIMENTAL RESULTS

Once this process is completed, information in the GIS system should be able to show all data including ownerships as an automated view. This is a table where all related records will be visualized to be able to easily understand and get full info.



Karshi Main Canal	
Short name (KMC)	
FID	0
Cadastral Number	0.0.0.0
Location	Kashkadarya province
Water intake	Amudarya River
Ownership	Basin Irrigation Authority
Purpose	For irrigation
Water discharge capacity	220 m3/s
Canal condition	Concrete/earthen
Length	86 km
Command area	260 ha
Start date	1965

Fig.3. Results of attribute table

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Fig.4. Example of Digital Cadastral Map

Above map shows how the system works actually. For instance, when you use info tool in GIS application, it will automatically have illustrated corresponding datasets and information of any given feature. So this way all other feature will have background information to visually interpretation and further monitoring of existing assets.

VI. CONCLUSION AND FUTURE WORK

The results providing more realistic results database for cadastral mapping and recording of feature datasets including institutional aspects. Due to limited data in electronic version it is difficult in terms of working with computer based datasets. Therefore, this kind of efforts and activities should be scaled up across region in order to get information in digital format of all features. Once they are developed in computer system, this will then help users and decision makers to find right path and make proper decisions. This attempt can be considered as initial step and can be even more modernized and enhanced so that there is a good water cadastre information system established. It is recommended that this could be baseline study which can be improved further.

REFERENCES

- Arshavir Avagyan, Hayk Yeritsian, Arayik Mkrtumyan, Aleksandr Arakelyan, Hasmik Manandyan, Anna Elbakyan, David Vardanyan, Artak Piloyan (2014). GIS for state water cadastre of armenia: Contents, structure, functions. Institute of Geological Sciences of National Academy of Sciences of Armenia
- Wolfgang W. Effenberg, Stig Enemark, Ian P. Williamson, Framework for discussion of digital spatial data flow within cadastral systems. (2014). Department of Geomatics the University of Melbourne, Australia
- Moha ELAYACHI and Prof. El Hassane SEMLALI, Morocco, (2014), Digital cadastral map: a multipurpose tool for sustainable development. International Conference on Spatial Information for Sustainable Development Nairobi, Kenya
- Wikipedia, https://en.wikipedia.org/wiki/Qashqadaryo_Region
- CAWATER info, Kashkadarya province, http://www.cawater-info.net/kashkadarya/index_e.htm



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