

APPLICATION OF GIS IN URBAN WATER MANAGEMENT IN CRITICAL CONDITION

Hossein Nazmfar¹

¹Associate Professor, Department of Geography and Urban Planning, Faculty of Humanities,
University of Mohaghegh Ardabil, Ardabil, Iran

Abstract

One of the problems in urban management system in natural crisis is providing of water for drinking, health protection and quenching of probable fire. In the appearance of natural crisis, accessing to correct information of urban water distribution network is very difficult. For the reason that the establishment of urban water network is underground. So, in this paper, we used GIS technology for management of urban water for optimum management in critical condition in Bonab city.

Firstly we collected data, importing, saving and managed its, in GIS. Secondly, the water distribution network are modeled and analyzed in Bonab city using of network analysis. Result of this paper show that the GIS (network analysis) is very powerful technology for analyzing of water utilities in critical condition.

Keywords: Water utilities; GIS; Modeling; Network analysis.

1. INTRODUCTION

One of the urban problems in natural crisis is water problem that this treated the health of people in the happening time of crisis. Disturbing of water source such as: spring, hole, subterranean canal, breaking water drinking and sewerage pipes, and disturbing of establishments that caused cutting off the electric, is initiated many problem for region residents (Motiyi, 2004). Those problems are an environmental crisis and initiated crisis condition for governments. Because, lock of water drinking and penetrated sewerage treated health of people and so caused that the contagious diseases such as: paludism speeded (Yasori, 2004).

In the time of natural crisis, one of the most horrible problems is urban water management problem. Water and sewerage network establishments spreading and no accessing to correct information caused that the people encounter critical condition (Hajiovandi, 1995). So that, accessing to suitable information for urban crisis management is necessary. The urban and sewerage organization don't access to this information in many city in Iran. But application of geographical information system can be resolved this problems (Gerami, 1996).

2. METHODS AND ANALYSES

In this paper, firstly, we collected descriptive data such as: urban water and sewerage distribution network, participator works and spatial data such as: water utilities map. Then, this data imported to GIS software for analyzing (figure 1).

In this paper, we used the following data:

1. Urban base map (1:2000), this map is provided by topography organization.
2. Urban water distribution map
3. Participator map - this map is provided by Water and Sewerage Company in Tabriz city.
4. Filtration map, treasure map and pumping station map.

Those data are imported to Arcinfo 8.1 and necessary process is done in this software. Then, maps imported to Arcview 3.3 and analyzed the water utility.

For hydrological modeling, the maps of water utilities, water tank, water pumping, water pipe and faucet created in separately layer are prepared and descriptive data added to table attribute of maps.

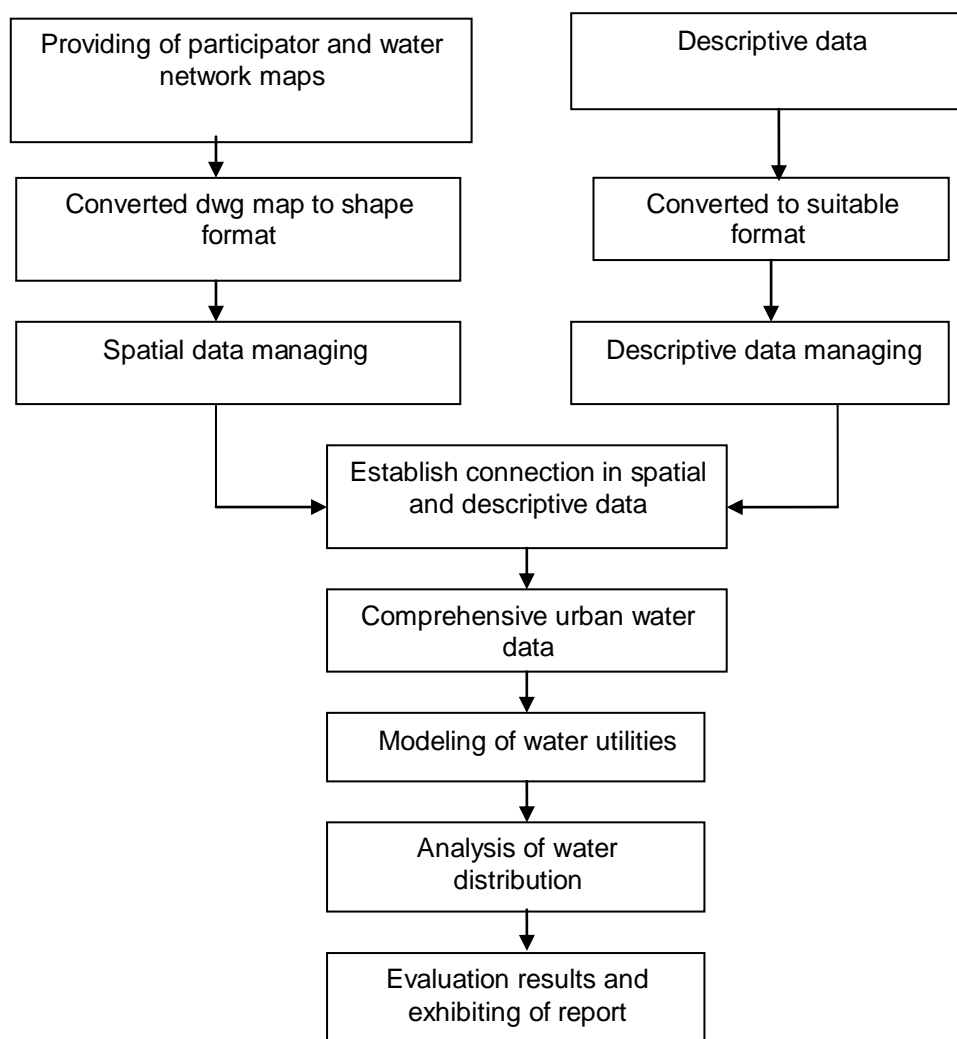


Figure 1. Modeling of urban water utilities process.

3. RESULTS AND DISCATION:

1- Preparing necessary maps for Analysis:

In this process, we provided following maps and data from deferent organization:

- Surveying the base map show that used map in water and sewerage organization doesn't conformity with present conduction. So that, for providing new map, the base map (1:2000) are toke from topography organization. Then, we arrangement this map and water establishments are draw in this map.
- Map of urban water and sewerage establishments are added to base map and the contradiction are corrected.
- In the next stage, the dwg format maps exported to GIS software and the necessary data are joined to base map.

Network Analysis

One of the most usage extensions in GIS software is network analysis. In these method geographical phenomena is analyzed in context on network (streets, water network pipe, telephone and electric line and so on). We analyzed the Bonab establishments using network analyzing. Result show that the network analysis very important instrument for water and sewerage network management in natural crisis. Figures 2 to 4 show the result of network analysis in Bonab city in critical condition.

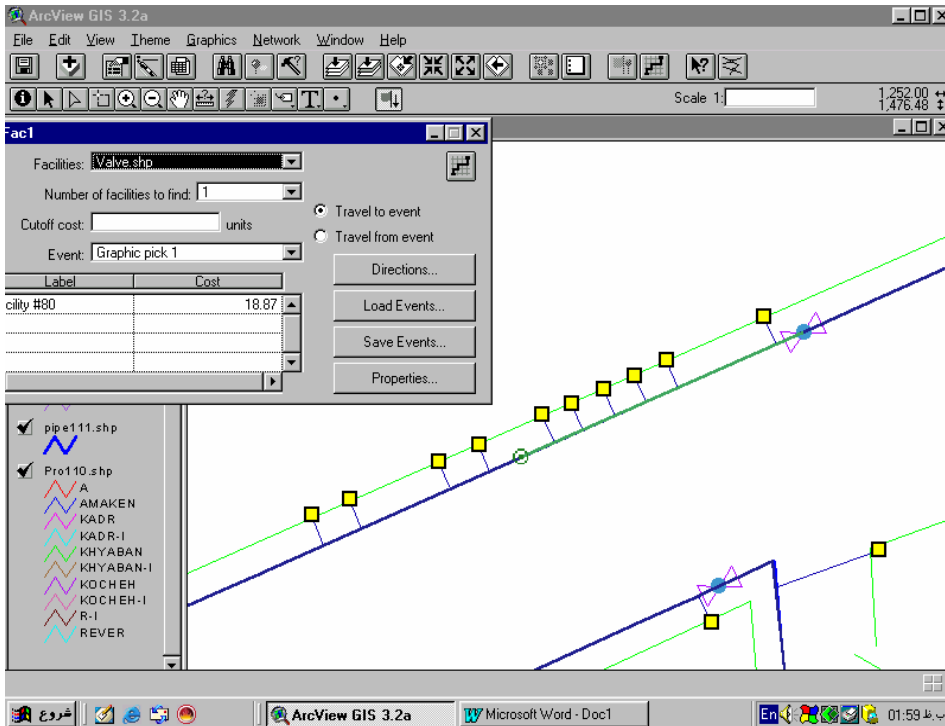


Figure 2. the nearest gate-valve in critical condition that must be closed.

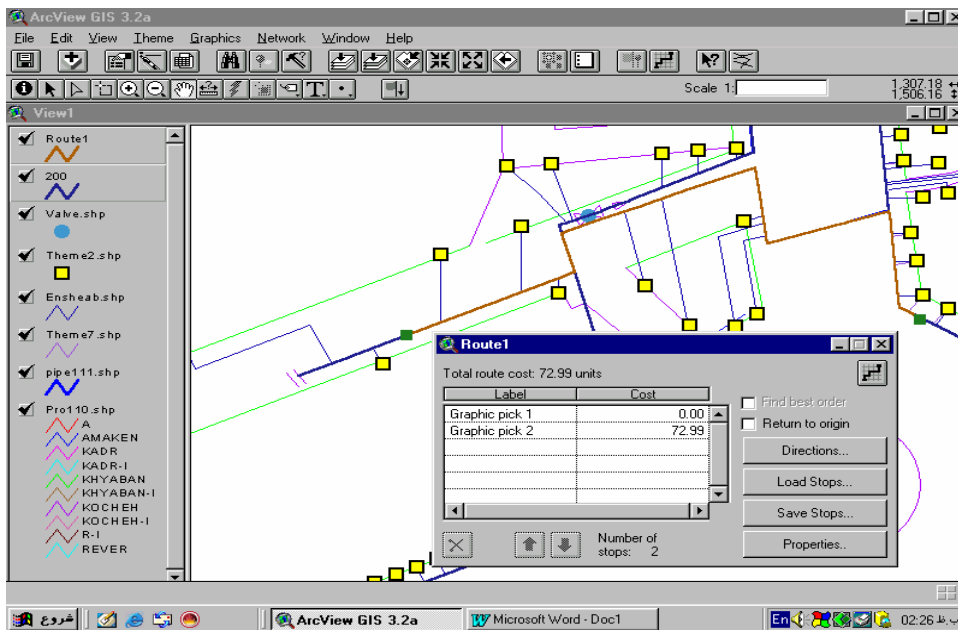


Figure 2. optimum and shortest route within two region with distance orientation.

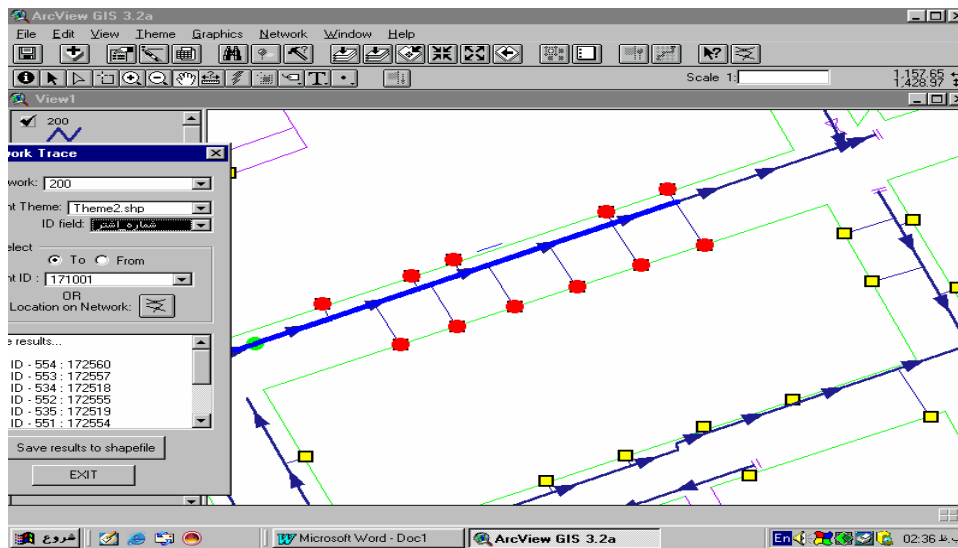


Figure3. The participators haven't water drinking in critical condition.

4. CONCLUSION

Expansion of subterranean establishment must be managed with up to date information, reservation, editing of information and analyzing process using GIS for decision-making and correct planning in critical. In this paper, firstly, we considered the application GIS in urban water management in natural crisis, then we used network analysis technique for analyzing water utilities in Bonab city. So that, contortions of urban establishments caused that the urban manager used GIS for arrangement of urban problems.

5. REFERENCES

- Hajivandi, M. (1996). Application of GIS in the case of Study and Compensation, topography journal, vol2, 20-25
- Gerami, R. (1996). Geographical Information System (Design, Modeling and application in planning). Planning and Budget Organization in Markazi County, vol 98, 15-18
- Motiyi, H. (2004). Application of GIS in flood-water engineering of Tehran Rivers, Syavash Publication.
- Yasori, M. (2004). Introduction on application of GIS Software, Astane Godse Razavi Publication.