RELATIONS BETWEEN DISASTER MANAGEMENT, URBAN PLANNING AND NSDI

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ABSTRACT:

Nowadays, Geographical Information Systems (GIS) are in a state to be used almost in every phases of a disaster management. Creating the scenarios, determining the risks, generating the sustainable plans, implementing the applications are the examples to use GIS for mitigation phase of a disaster management cycle (DMC). Urban and regional planning activities also play important roles in mitigation phases. Similar to planning process, DMC mostly requires integrated data from multiple sources and coordinated institutional structure. Although GIS tools are able to handle different datasets for spatial analysis; integration of that data and organizing the institutes requires modern approaches or frameworks such as Spatial Data Infrastructures (SDI).DMC has been structured with several institutions in Turkey, however, GIS has not been effectively in use. The most important reasons of that in the current situation are lack of coordination between institutions and arrangements of laws and budgets. The key for those problems seems to be the implementation of NSDI for Turkey.In this paper, it is aimed to discuss the importance of the implementation of NSDI in disaster management cycle which supplies core data to urban and regional planners.

1. INTRODUCTION

Disasters are incidents that cause corruption of normal life, deviation from ordinary expectations of individuals and groups.

The causes of the disasters are split into two groups. One of them is natural disasters and the other one is human-induced disasters. Natural disasters include occurrences such as earthquakes, storms, tornados, floods, fires, tsunami, landslides, avalanches, volcanoes, and drought. Turkey is mostly being suffered from earthquakes with devastating consequences.

On the other hand, human-induced disasters are events such as fires, explosions, mine accidents and detonations, pollution, traffic accidents, radioactive pollution, thermo-nuclear wars and battles.

Mostly, disasters have crucial negative effects on people, environment and economy. The direct effects of a disaster can be as follows;

- Life losses, injuries,
- Demolition or corruption of buildings, roads etc,
- Effects on properties and incomes of individuals, enterprises and societies;

and while redirect effects can be arranged as follows;

- Reductions on income of families and enterprises as a consequences of chain reactions,
- The secondary effects such as epidemics, inflation, raise of income inequality
- Physiological effects.

Disaster management is a cycle which aims to reduce or avoid the described effects, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery. It also provides coordination of all public institutions and sources and applicability for the common purpose (Sengezer, 2001). Mitigation, preparedness, response, recovery are the phases of a disaster management (Figure 1).

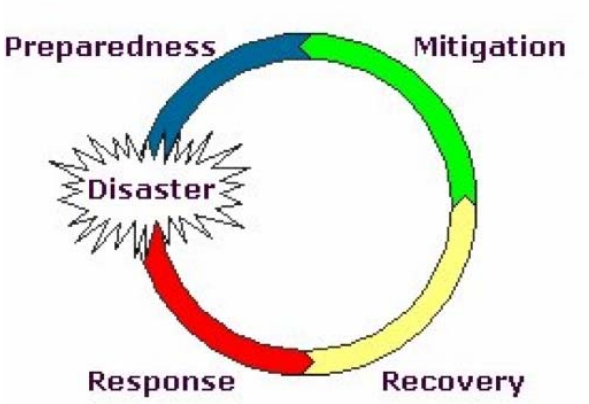

Figure 1. Disaster management

When the actors of a disaster management are considered in Turkey, there are approximately 50 institutions, organizations etc in action. However, it is necessary to organize those institutions and data, and to implement the applications, effectively.

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2. RELATIONS BETWEEN DISASTER MANAGEMENT AND GIS

A GIS is known to be a system that is comprised of data, software, hardware, human and management components. There are mostly accepted expressions about GIS in GI communities;

- By using GIS software and spatial databases (or spatial data services with new trend), it is possible to store coordinate values, properties and temporal values of features which may be located on the, under the or over a surface.
- Most of the GIS software has been covered with several functions to store data, access data, implement queries and analyses, and create outputs.
- Nowadays, many individual users and institutes use services- which are implemented conforming to standards- to search, find, access and uses the spatial data over internet (Emem, 2007).

Considering GIS as underpinning technology for spatial technologies and its role in facilitating data collection and storage as well as facilitating decision-making based on spatial data processing and analysis, GIS is a good tool for improving decision-making for disaster management (Mansouriana et al, 2002).

In case of a disaster event, it is important to locate the centre of the event and possible affected areas on the earth with coordinates; because, most of the information required for a disaster management has a spatial component or location (Cutter et al, 2003; Budic and Pinto, 1999). The other important thing is the information obtained from a disaster can be also used for a mitigation phase of another disaster management because of the similarity of estimations or similarity of different disaster areas. Therefore, it is possible to use the information of a disaster (especially spatial information) for another site. In this respect, one of the spatial data and related technology "GIS", have proven to be important for disaster management (Cutter et. al, 2003; Amdahl, 2002). It means, GIS can be used as an effective technology to support decision-making in all phases of disaster management.

3. RELATIONS BETWEEN PLANNING, GIS AND DISASTER MANAGEMENT

Urban and regional planning is one of the disciplines which carries out spatial studies and facilitates the usage of GIS (Figure 2). Urban and regional planners plays important role in disaster management with other disciplines especially in mitigation phases. Hazard mitigation—which is an action taken to lower or eliminate the long-term risk to people and property (Godschalk, 2003)—involves measures that range from structural engineering and building code standards to land use planning and property acquisition (Schwab, 1998).

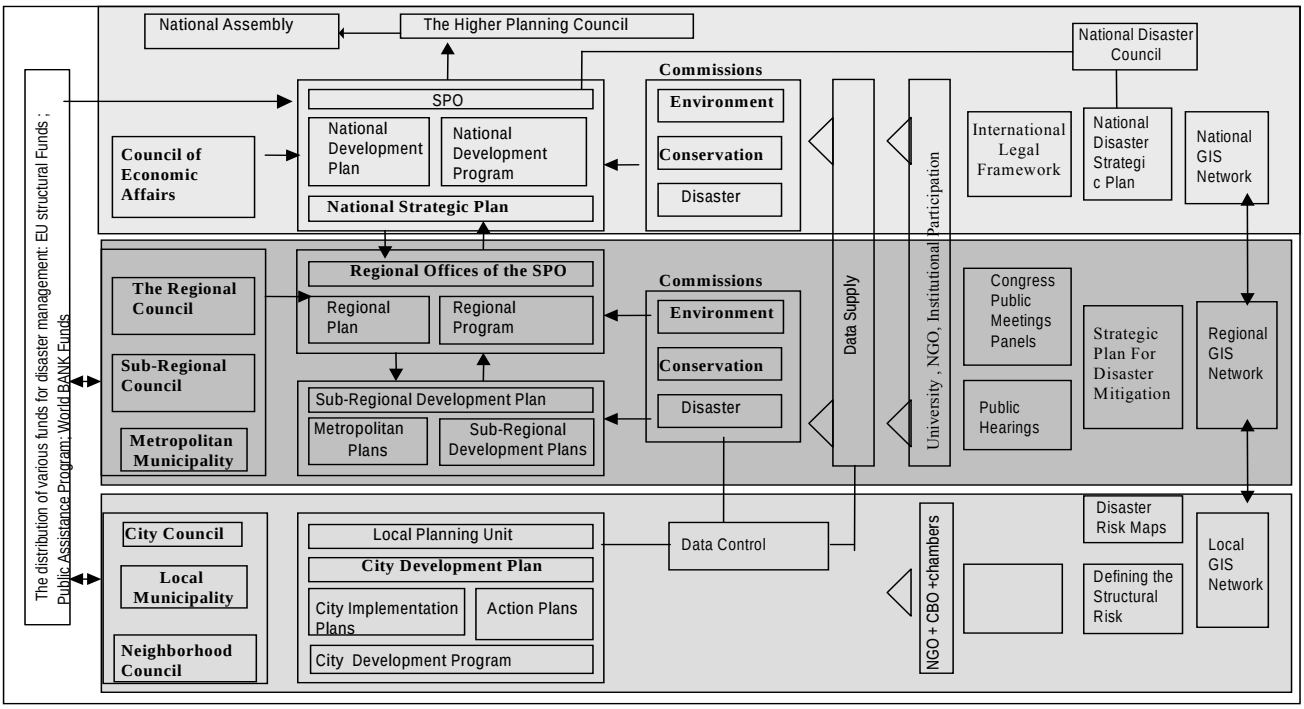

Figure 2. Planning environments, GIS and disaster management elements (IDMP, 2003)

Although plans are indispensable elements of disaster management in Turkey, the planning system does not seem to be operated properly. However, in some cases, it increases the disaster risk. As depicted in Figure 2, the planning system integrated mitigation plan has been suggested in the Istanbul Metropoliten Area Disasters Mitigation Plan Project(IDMP, 2003).

As far as the plans and programs are considered from GIS point of view, planners mostly requires spatial data in national-regional-city levels respectively. However, those levels of data should also be integrant in each other. This situation corresponds with 1 to 1000000, 25000 and 5000-1000 scaled maps in the national reality.

Actions of planning and DMC should be supported by interactions of many institutes, datasets and decisions. But, in this case different problems reveals due to the number of datasets from different levels, standards and organizations.

GIS and other related technological improvements allow interactions of data and results of actors of disaster management in each other. With respect to this point of view, it is showed that using SDI and other related GIS applications as an integrated framework for managing spatial data, disaster management can be facilitated (Mansouriana et al, 2002). However, spatial data have been collected by several organizations or institutions. This causes a decentralised data warehouses and then interoperability problems because of differences in database schemas. According to the results of a survey by the sub-project "Data management and GIS" on the

scientists demands suitable data had been centrally acquired (Kohler et al, 2006). In this manner it is required to implement NSDIs in various levels in order to facilitate spatial data from different institutions.

4. NSDI AND DISASTER MANAGEMENT

SDIs aim at facilitating and coordinating exchange, sharing, accessibility and usage of geospatial data and encompass networked spatial databases and data-handling facilities, complexes of interacting institutional, organizational, technological, human and economic resources (Groot and McLaughlin 2000; Rajabifard et al., 2002; Crompvoets et al., 2004; USF, 1994).

When the infrastructure is implemented, it is technically possible to find, access, view and evaluate the spatial data and metadata in a connected and distributed spatial database environment in a national level. It is also possible to achieve that internationally, if the profiles are prepared conforming to the international standards or specifications such as ISO 19100, OGC (Emem, 2007).

In Turkey, the studies related to NSDI have been initialized with 47th Action in the e-Government Turkey Project in 2004. The same action was adopted in plan 2005 and replaced with 36th action. The main goal is same in both of the actions with preparation of the research and reports for standards, processes, etc.

According to the Information Society Strategy and supplementary Action Plan, which was published and approved by Superior Planning Committee on 11/07/2006 with number 2006/38, the action number has been changed to 75 and action was changed into an application project, the project results are being expected to be activated at the end of 2010 in Turkey.

When the NSDI is implemented in Turkey, data for planning and disaster management easily find and access. According to Emem (2007), this possibility will be implemented as given in Figure 3.

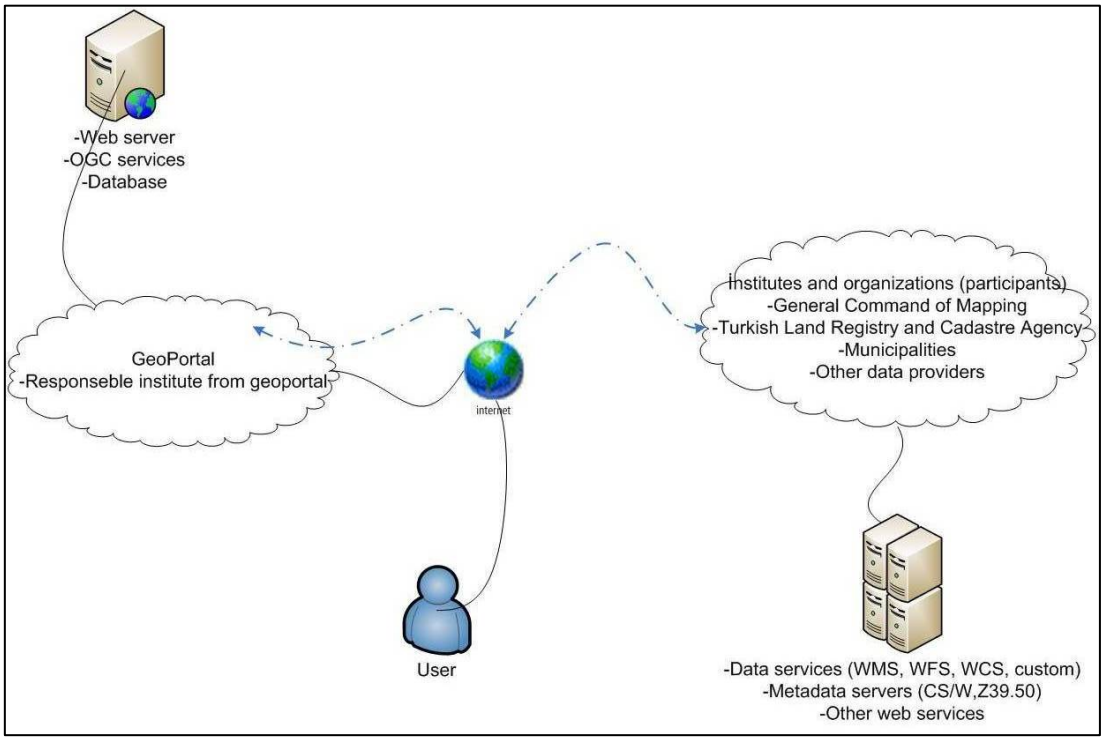

Figure 3. Data communication in NSDI framework

As depicted in this figure 3, data or metadata providers publishes the data through spatial web services such as CS/W, Z39.50, WMS, WFS or WCS. Directing and accessing those services are implemented via a central GeoPortal. Therefore any user of Geoportal will not consider the standards or data structures of publisher. GeoPortal queries and retrieves data (spatial data or metadata) from web services according to the user's criterions.

5. CONCLUSIONS

The role of the plans in mitigation, preparedness, response, and recovery phases of natural disaster management, and role of spatial data in creating those plans are very important. On the other hand required data also should be exist and accessible in order to prepare plans according to the data. Even though the data exists, it should be accessible as well. However, the data is distributed to several institutions and the volume of those data is very large.

It is only possible to obtain reliable, applicable and effective results related to plans and disaster management, when GIS, under an e-Government/NSDI umbrella, is used. Because, those processes requires up to date and any related data which is stored in distributed databases.

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