

UTILIZING CARTOGRAPHIC SOURCES INTO GIS CASE STUDY: BURSA MURADIYE DISTRICT

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ABSTRACT:

Cartographic and visual sources are one of the main data for Geographical Information System (GIS) based urban conservation projects. Historic maps which are geographically correct can be utilized to GIS as an important historic source and the ability to transform those cartographic sources into contemporary coordinate systems enables to use those documents as valuable source of historic data.

“Muradiye District Urban Conservation Project” has been prepared through the Rest.507 Course in Graduate Program in Restoration, METU, for the historic Muradiye District in Bursa Turkey. This GIS based urban conservation project includes documentation, analysis and evaluation processes, where different kinds of data were used. This paper aims to analyze utilizing the cartographic sources as an important historic data for GIS based urban conservation projects.

1. INTRODUCTION

Conservation of urban cultural heritage is a process where different kind of data utilized related to the social, economical and cultural aspects of the historic town. At this point historic maps and photographs are valuable sources in conservation decision making process. The developments in the information technologies enable to use those historic sources in various formats and types. As information systems developed to deal with complex geographical data, GIS can be considered as an important management system throughout this conservation decision making process.

Muradiye District Urban Conservation Project has been prepared in the fall semester of 2004-2005 academic year, for the Rest. 507 Course in Graduate Program in Restoration, METU for the Historic Muradiye District in Bursa – Turkey. As an important historic city, the establishment of the city of Bursa dates back to 185 BC. Other than being one of the capitals of the Ottoman Empire, the city of Bursa has edifices from different civilizations such as Roman Empire, Byzantium, Seljukids, etc. Therefore there are many cartographic sources that can be found for the city itself that has been prepared in different time periods.

This paper introduces the following sections;

- Information about Muradiye District Urban Conservation Project.
- Methodology of utilizing different cartographic sources during the conservation decision making process for Muradiye District.
- Assessment of the use of cartographic sources as a part of GIS based urban conservation studies.

2. MURADIYE PROJECT

Muradiye district (Figure 1) has been an important settlement area throughout the history of the city of Bursa. The social and economical importance of the area can be identified through the historic buildings that can be found today, including three silk factory complexes and four mosques one of which is the Muradiye Mosque that is part of Ottoman Period Muradiye Complex with 12 tomb buildings, a hamam building and a medrese. Other than the monumental buildings, Muradiye district has many examples of historic dwellings constructed with traditional timber frame structures that are situated in an organic street pattern following the topography.

There are 258 building in 177 parcels in the selected area that has been introduced as the primary study area for the project. This area has been studied through the survey sheets and detailed sketches and photographs. Close environment of the primary study area defined as secondary and tertiary study areas. These zones have been studied less in detail compared to the primary study area of the project.

The major characteristics of the site was the nearby *Cilimboz River* on the west side of the area, which is one of two rivers that shaped the urban characteristics of the city throughout the history, *Yahşi Bey Street* passing through north and south axis of the primary study area, which has many examples of traditional timber frame structures, historic *Silk Factory Buildings* situated along the *Cilimboz River* and *Hisar* area with its sloped topography.

The aim of the Muradiye District Urban Conservation Project is to identify and evaluate the values, potentials and problems of the area and to introduce conservation proposals related to the site by using GIS as a supporting conservation decision making tool.



Figure 1. Muradiye District Bursa – Turkey

2.1 Methodology

Urban conservation project prepared for Muradiye District can be classified in four major stages; *Pre-site Survey Stage*, *Site Survey Stage*, *Analysis and Evaluation Stage* and *Decision Stage*.

Muradiye Urban Conservation Project started with the collection of the data available, through a literature study. Written documents, old maps and photos, historic engravings, descriptions of the sites from previous site works, previous conservation studies related to the site, etc. were collected. At this stage, the survey sheets for the traditional and new buildings and public open areas, social questionnaires for the inhabitants and base maps have been prepared to be used during the site survey.

Throughout the survey stage data related to the physical and structural condition of the built up areas of the site were collected and social survey questionnaires for the inhabitants have been applied in order to evaluate the socio-economical aspects of the historic site. With the help of the previously prepared survey sheets, detailed data collected about the interiors and exteriors of the new and historic buildings.

Data collected throughout the survey stage have been analyzed during the analysis and evaluation stage. In order to define the general characteristics of the site and visualize the problems and values in building scale and site scale, different GIS maps have been prepared and evaluated including the restitution studies about the historic buildings in building scale.

The proposed urban conservation decisions were introduced during the decision stage. Intervention decisions in building and lot scale, decisions about the structural and physical conditions of the historic buildings, the future functions of the built up areas and empty lots in relation to the site scale decisions, intervention principles for building groups, etc. were part of the proposal after the evaluation of the physical and social aspects of the site.

2.2 Cartographic Sources

Throughout the urban conservation decision making process, rich and complex data is evaluated and it is widely important to trace the changes in historic settlements. At this point cartographic sources such as historic maps and photographs provide a valuable historic data in order to understand the values and potentials of the historic settlement.

Cartographic sources that have been used for Muradiye District Urban Conservation Project were provided by the Bursa Metropolitan Municipality archives. Six different historic maps were used as visual data throughout the study. Two of them have been transferred to GIS environment due to their geographically correct representation.

The historic maps as sources of data for this study are listed as follows:

- 1776 – Niebuhr Map
- 1862 – Suphi Bey Map
- 1907 – Cadastral Map
- 1922 – Cadastral Map
- 1938 – Cadastral Map
- 1958 – Piccinato Map

The oldest of all those historic maps was 1776 – Niebuhr Map. (Figure 2) The information that gathered from this map was basically about the non-Muslim quarter of the city of Bursa. Muradiye district that is represented by yellow color has a close relation with the Greek quarter of the city, which proves the Greek inhabitation at the settlement. This map did not have a detailed plan and did not provide a geographically correct representation.

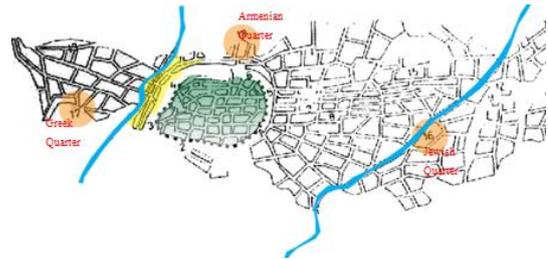


Figure 2. 1776 – Niebuhr Map

One of the major data collected from historic maps for Muradiye Urban Conservation Project came from 1862 – Suphi Bey Map. (Figure 3) On January 31st 1855 a major earthquake hit the city of Bursa and in following year a team of professionals commissioned to document the structure of the city from Harbiye Military School led by a surveyor Suphi Bey. This map was published in the year 1862.

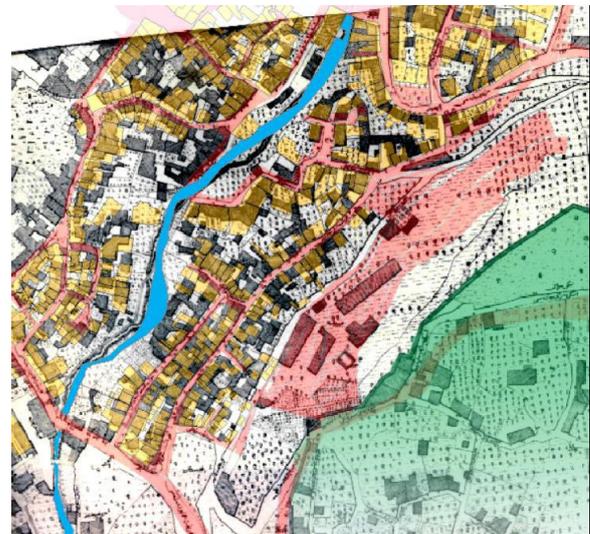


Figure 3. 1862 – Suphi Bey Map

Suphi Bey map provided valuable data about late 19th century Muradiye District with its detailed documentation and geographically correct representation. By georeferencing the rectified map in GIS environment it became possible to visualize and create the map in digital format. Open and built up areas, public open areas and information about the monumental buildings on Muradiye District documented by using GIS.

Evaluating Suphi Bey Map, many GIS visuals were created by overlaying the historic data and today's conditions. The major result that has been provided from Suphi Bey Map was about the changes of built up areas and lots through the time. By identifying these it was possible to find out the most and least changed zones and the lost values of the study area.

1907 and 1922 Cadastral maps (Figure 4-5) are other historic maps that have been studied during the Muradiye District Urban Conservation Project. Both maps showed data about the general growth of the city of Bursa by showing the new residential neighborhoods with grid iron plan (the orange area) or new major roads in relation with the Muradiye District and the selected primary study area. (the yellow areas) 1907 and 1922 Cadastral maps were not used in GIS due to their less detailed representations.

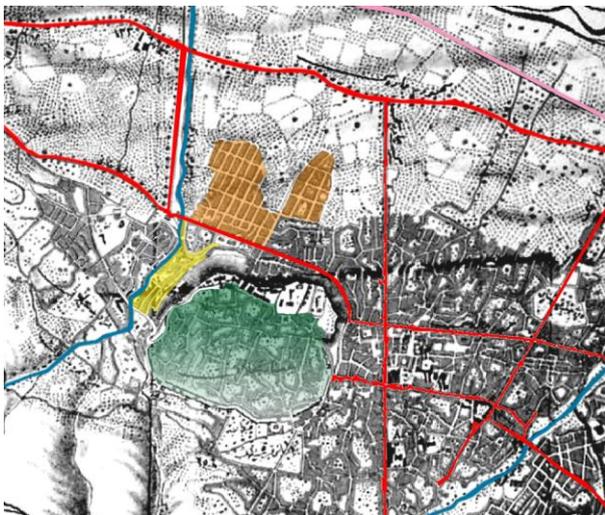


Figure 4. 1907 – Cadastral Map

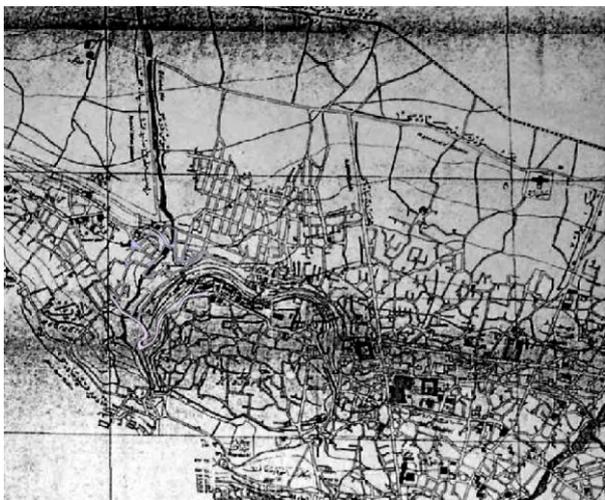


Figure 5. 1922 – Cadastral Map

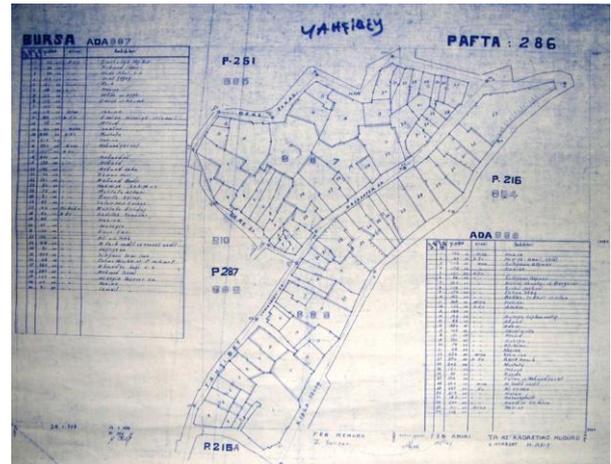


Figure 6. 1938 – Cadastral Map

1938 Cadastral map (Figure 6) was the other major historic data source for Muradiye District Urban Conservation Project. With its detailed lot and building representation and geographically correct visualization it has been transformed to GIS environment the digital format of the historic map was created.

Similar to Suphi Bey Map changes through the time in open and built up areas, public and private open areas and lots could be identified by overlaying the map with today's situation. Another overlaying study has been made by using both Suphi Bey Map, 1938 Cadastral map and current situation. The change similarities and differences between those years were identified and most and least changed zones were found out.

Another data coming from 1938 Cadastral map was about the functions of the buildings and building lots of the study area. By overlaying the 1938 data with current situation, changes of the functions of the buildings during this time period was also identified.

1958 – Piccinato Map (Figure 7) was prepared for Planning Department of Bursa Municipality by Luigi Piccinato after a great fire in 1958. This map was not used in GIS environment but data provided about the change in traditional buildings with new structures from Piccinato Map.

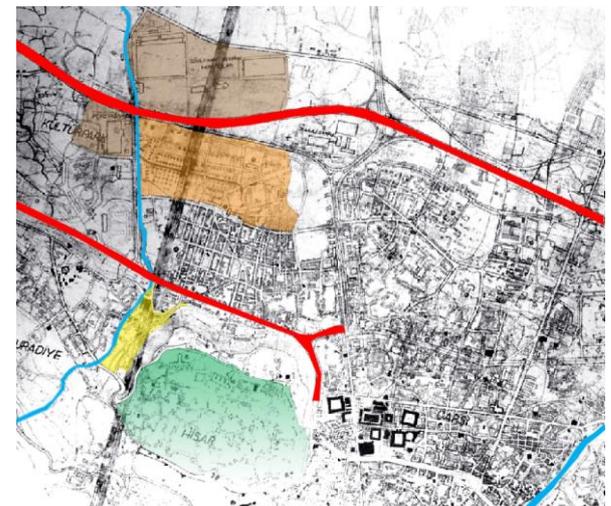


Figure 7. 1958 – Piccinato Map

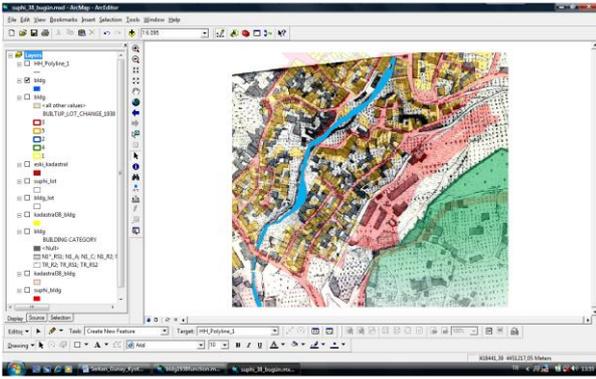


Figure 8. Defining open and built up areas of Muradiye District from 1862 – Suphi Bey Map

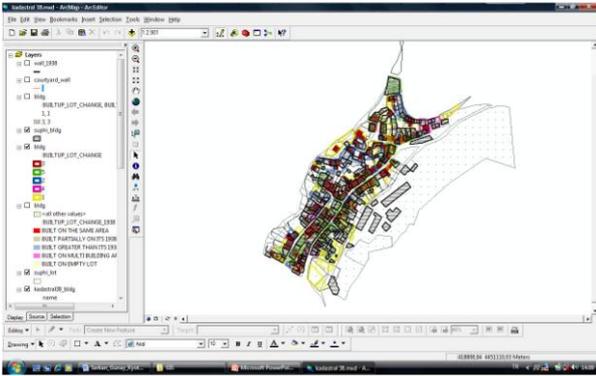


Figure 9. Comparing built up areas from different periods in GIS environment.

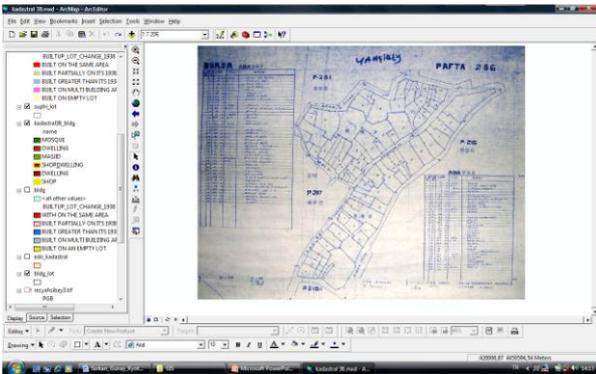


Figure 10. Studies on 1938 Cadastral Map

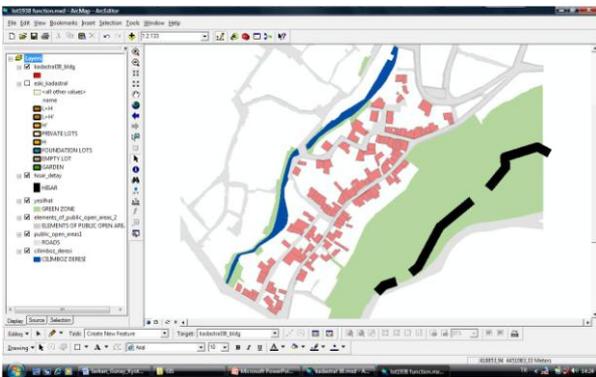


Figure 11. Defining open and built up areas through 1938 Cadastral Map

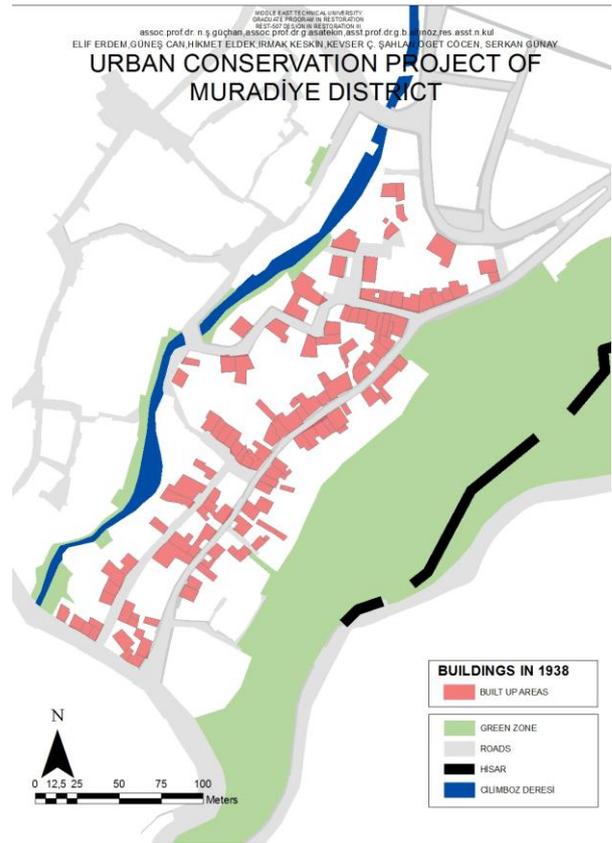


Figure 12. Open and Built up areas in 1938

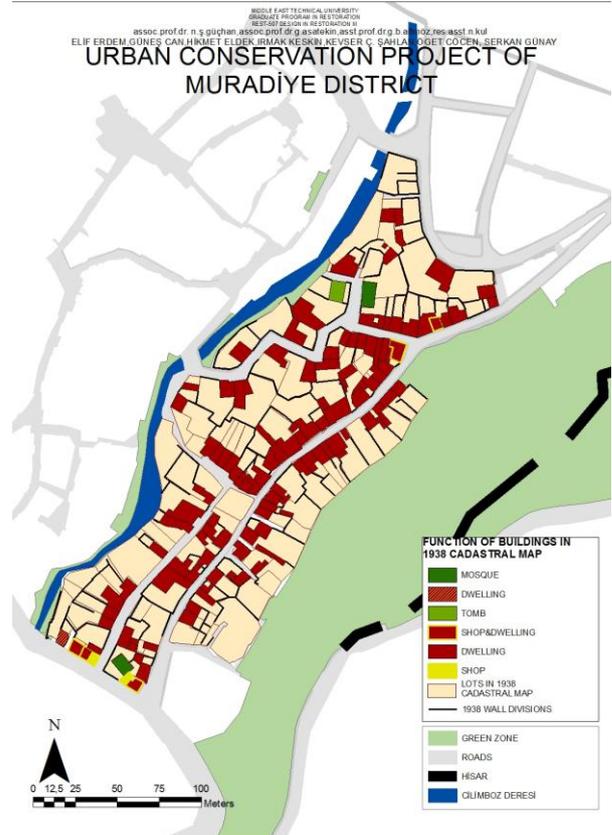


Figure 13. Functions of the buildings from 1938 Cadastral Map

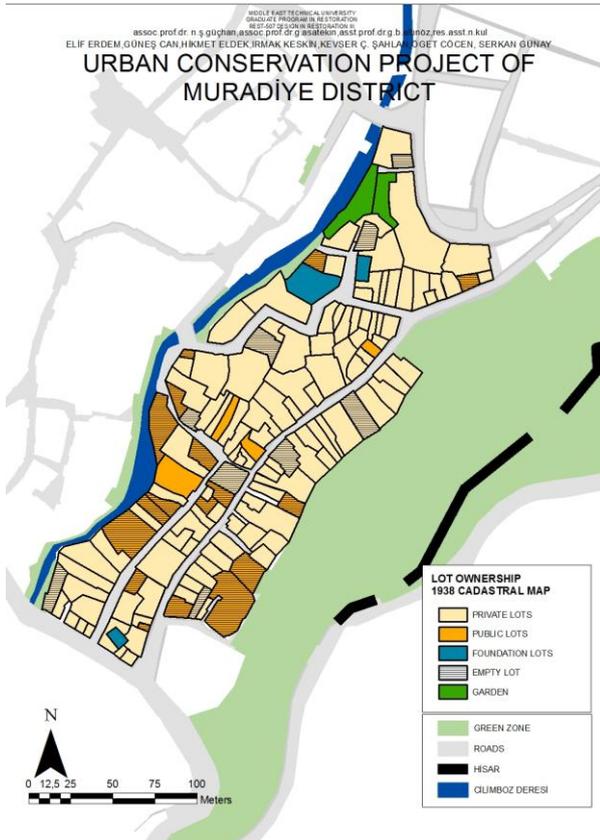


Figure 14. Lot ownerships from 1938 Cadastral Map

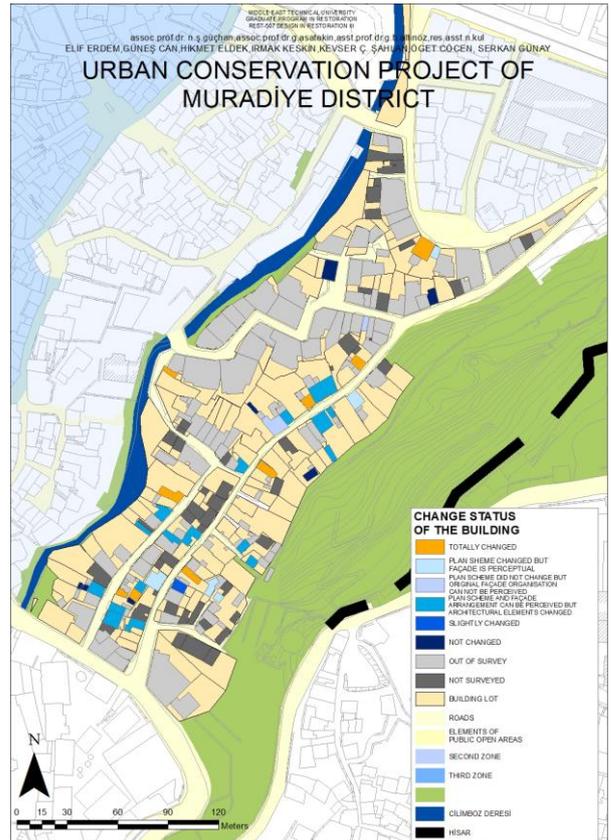


Figure 16. Change status of the buildings

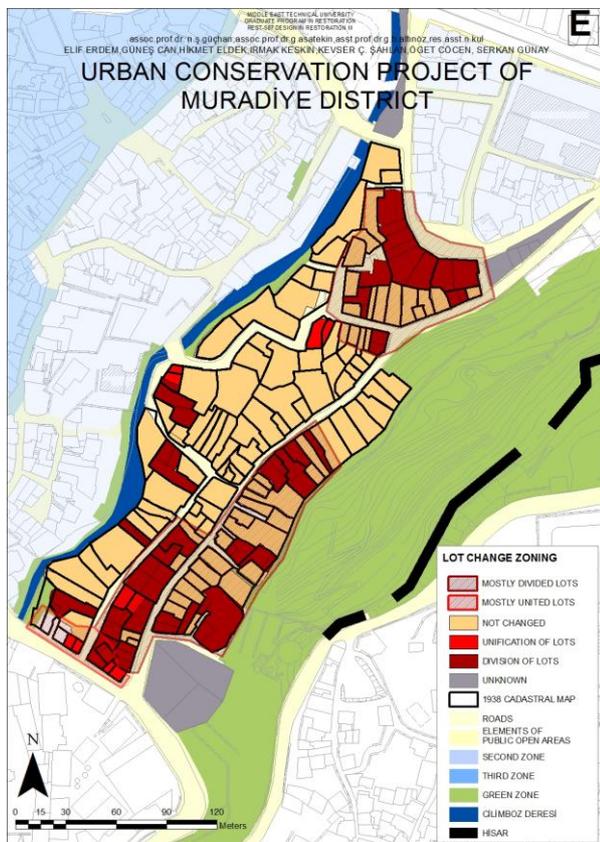


Figure 15. Lot change zoning

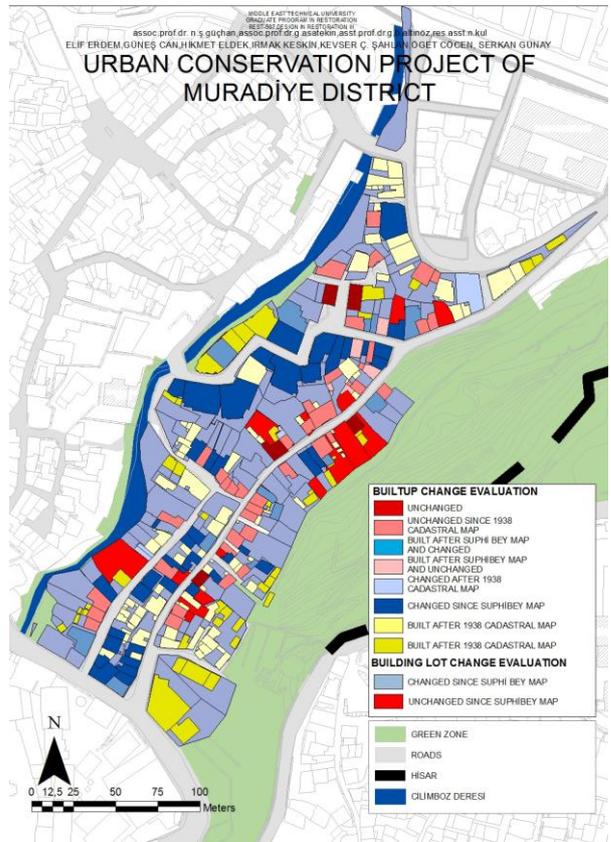


Figure 17. Evaluation of change in built up areas and lots

3. CONCLUSION

Conservation decision making process of historic sites requires the management of collected and evaluated data in order to improve the quality of information gathered. Throughout the Urban Conservation Project of Muradiye District rich and complex data is evaluated by using Geographical Information Systems. In order to understand and evaluate the importance of Muradiye District it was crucial to define the potentials, values and the changes of the area. At this point utilizing different cartographic sources into GIS, from different time periods, provided valuable historic data from different subjects.

By adopting 1862 – Suphi Bey Map and 1938 – Cadastral Map, which are geographically correct, into GIS environment, it was possible to define and visualize the changes at the historic site in terms of functions, building types, lot usage, open and built up areas, lot ownership, etc (Figure 12-17). And also by juxtaposing the three different maps, it was possible to evaluate these topics by comparing those different time periods.

NOTES:

“Urban Conservation Project of Bursa Muradiye District” has been prepared through the Rest.507 Course in Graduate program in Restoration, METU, within the Fall Semester of 2003-2004, by the students; G. Can, O. Cöcen, H. Eldek, E. Erdem, S. Günay, I. Keskin, K. Şahlan under the supervision of Assoc. Prof. Dr. N. Şahin Güçhan, Assoc. Prof. Dr. G. Asatekin and Asst. Prof. Dr. G. Bilgin Altınöz.

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