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PS 4.3 Changing Spaces and Places
[PS_4.3_099_GUL-KELES-UZUN]

Approach of Online Access to Inventory Data of Urban Trees by ArcGIS (Case of Isparta City)

URBAN TREES INFORMATION SYSTEM MODEL

- Atila GÜL* Emine KELEŞ Ömer Faruk UZUN

***Suleyman Demirel University Faculty of Architecture, Department of Landscape Architecture, Isparta/Turkey**

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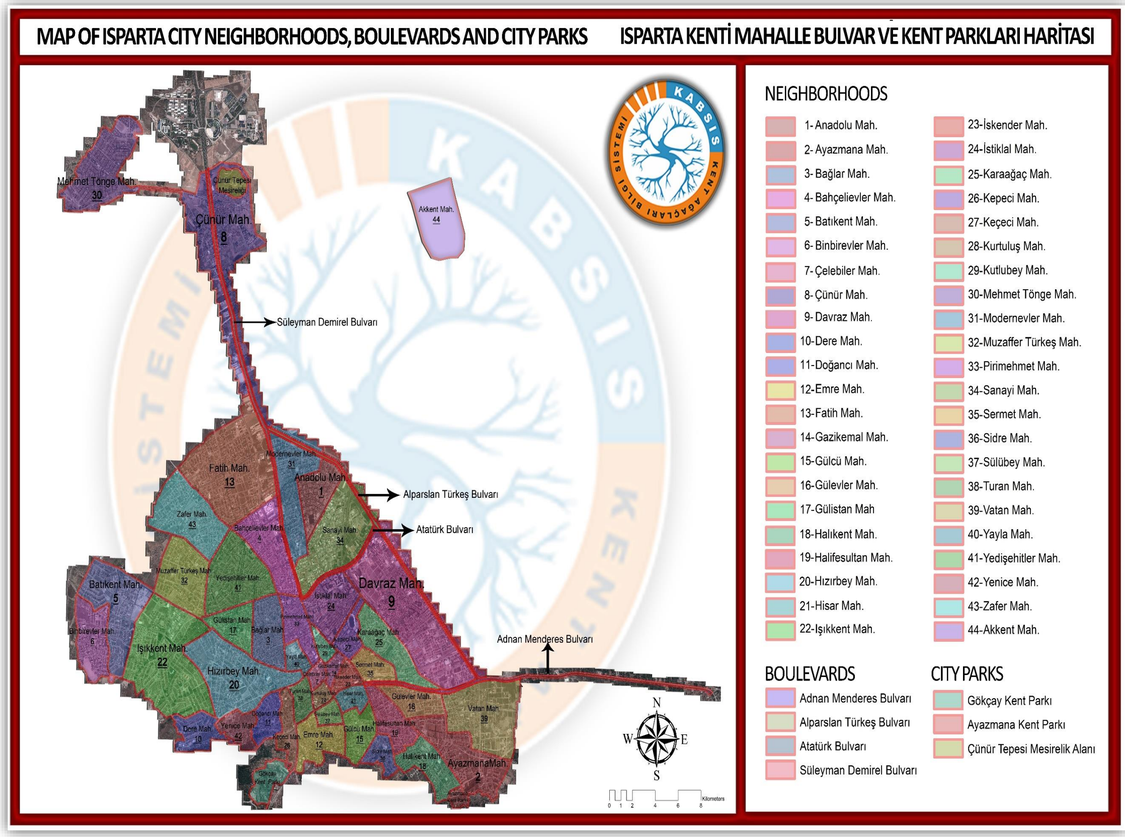
Project Title : Urban Trees Information Systems (UTIS)

- This study was realized to approach of a **Urban Trees Information Systems** (UTIS) in case Isparta city in Turkey by sponsored TUBİTAK (Project#:110Y301).
- Project Manager : Prof. Dr. Atila GÜL
- This Project was started in 2011 and finished in 2015.
- Urban trees information system model has been carried out for the first time in Turkey.
- This study was consisted of five phases.

a) The digital maps were obtained by support satellite image,
b) Survey sites were determined,
c) Trees Inventory studies were realized in 43# neighborhoods of the City,
d) Collected data were digitized, questioned, and analysed in ArcGIS based,
e) 3D modelling of trees were carried in ArcGIS based,
f) Obtained data was shared as online in WEB.



- Inventory data of existing trees in the parks, boulevards and streets in neighborhoods (43) , which have been responsible by Isparta Municipality, were obtained by measurements and observations of each tree in field survey works.

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The Aim of This Study

- The aim of this study was suggests to urban trees information system approach for provide urban trees structural data (e.g., number of trees, species composition, tree size, health, tree location) for estimate total leaf areas, leaf biomass and trees ecosystem services the basis to sustainable planning and managing of the urban trees.
- And also tree inventory data will share as online in WEB to urban residents, planners, city managers, decision-makers and others.

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A tree inventory form includes:

- Tree ID code,
- Location name and number,
- Species (Latin, English and Turkish name)
- Tree height (m),
- Unbranched trunk height (m),
- Diameter at breast height (DBH=d1.30 m),
- Crown diameter (m),
- Number of trunk,
- Ages,
- Habitus (form),
- Reserved soil area,
- Death case the percentage of tree crown,
- Light exposure the percentage of crown,
- The percentage of losing crown (%),
- Functional specifications,
- Health status,
- Tree defects,
- Care and protection measures and others.

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Data Analysis includes;

Inventory data of existing trees in the parks, boulevards and streets, which have been responsible by Isparta Municipality, were obtained by measurements and observations of each tree in field survey works.

In each study areas, tree inventory data were analysed and obtained to % distribution in ArcGIS-based of Isparta City;

- **number of trees,**
- **species composition and distribution,**
- **tree age,**
- **tree height,**
- **diameter at breast height,**
- **crown diameter,**
- **functional characteristics,**
- **tree health, care and protection status,**
- **leaf surface area and leaf biomass**

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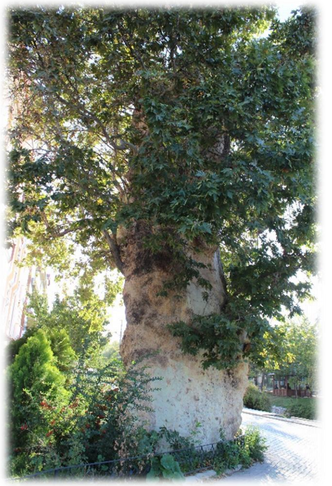
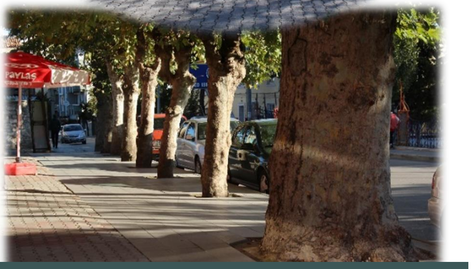
According to analysed tree data in Isparta

- Isparta has total 46.254 tree numbers and different 80 tree species.
- Approximately 70 percent of the total trees are broadleaves trees and 30 percent are conifer trees.
- The predominant city tree species are *Fraxinus excelcior* L. (16 %), *Platanus orientalis* L. (10 %), *Pinus nigra* subsp pallasiana (Lamb.) Holmboe (13 %), *Cedrus libani* A. Rich (9 %), *Robinia pseudoacacia* “Umbraculifera” L. (8,6 %), *Tilia tomentosa* L. (5.5 %) and others.
- Total crown shade of trees in study areas were covered approximately 6,6 % of the city.
- The leaf biomass of all trees 248,513 tones.
- However, 3D modelling of trees were done in ArcGIS programme.
- Obtained data of trees were also opened online sharing by created WEB (http://kabsis.sdu.edu.tr).





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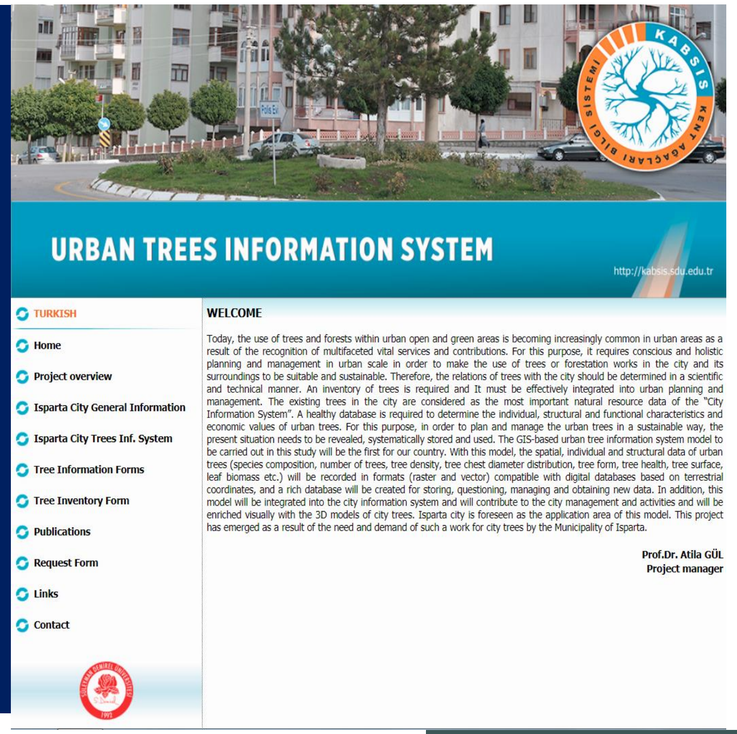
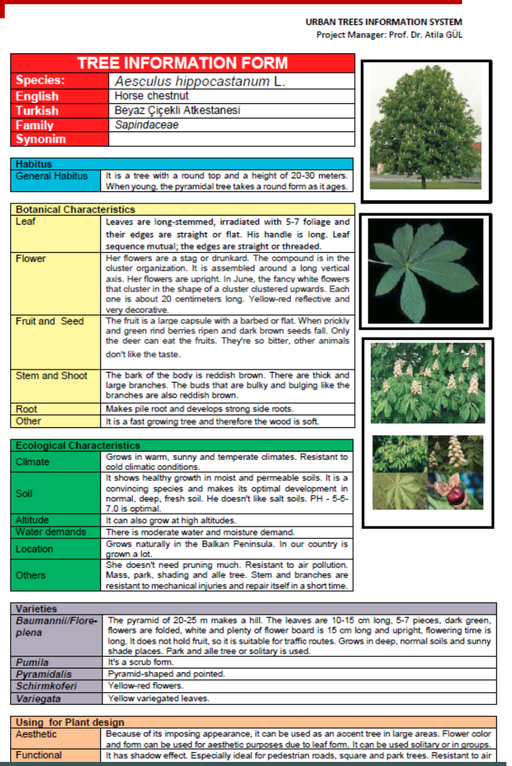
- Within the scope of the project, Urban Trees Information System Model (UTIS) was created on the network servers of Süleyman Demirel University in order to share and inform the relevant stakeholders about urban trees and urban forests.
- And also http://kabsis.sdu.edu.tr web page was designed.

The web page of UTIS (http://kabsis.sdu.edu.tr) contains

- Home Page
- Project overview
- Isparta City General Information
- Isparta trees information system,
- Isparta tree species list and information forms
- **Tree Inventory Form**
- Some scientific publications
- Links about urban trees and forests.





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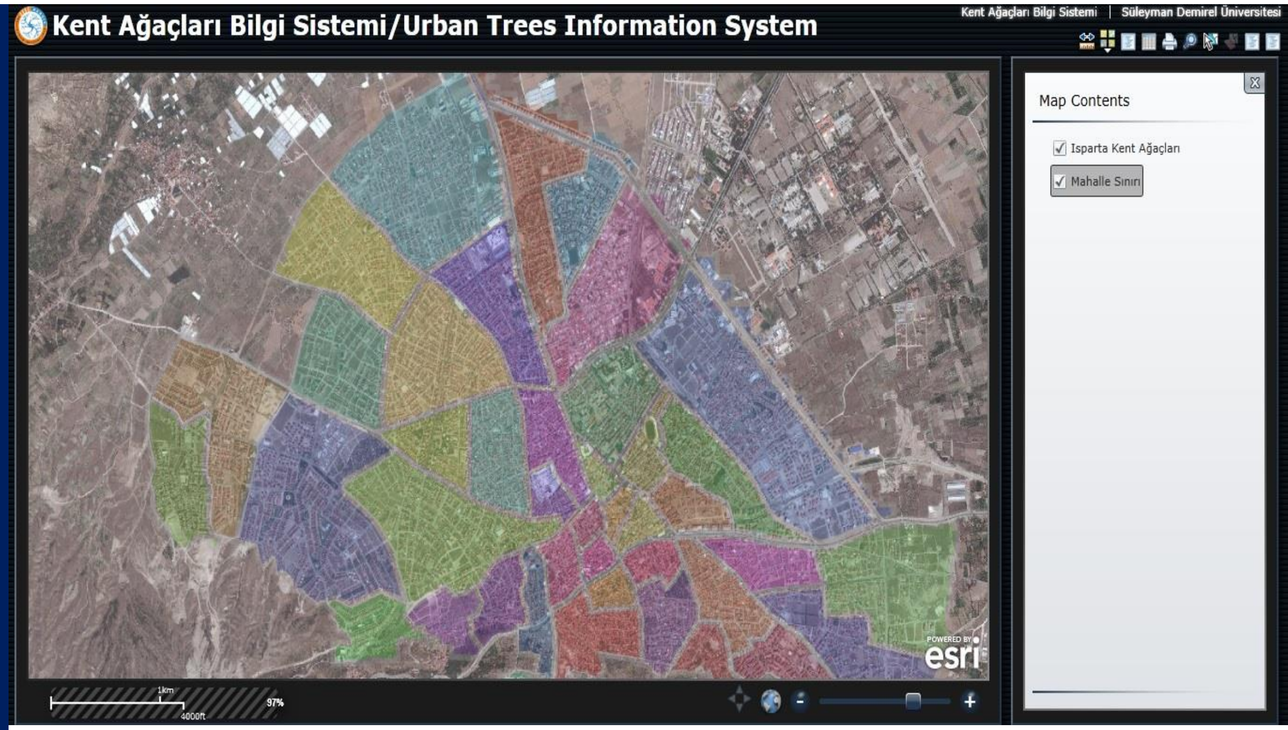
The web page of UTIS

"Isparta City Trees Information System" may be provided access in the work area covered attribute information as online by each tree.

- This server features;
- (http://kabsisdata.sdu.edu.tr/)
- 200 GB (WEB space), 100 GB (Database space), Linux + MYSQL (Software support information), 7 days and 24 hour uninterrupted http access, ULAKNET (Spine connection), 350 MB Bandwidth.



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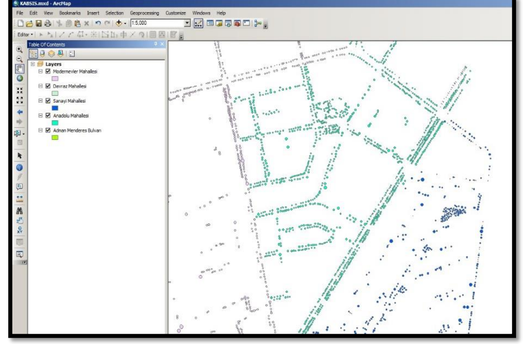
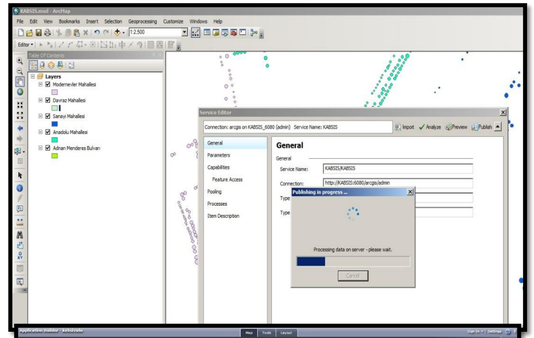
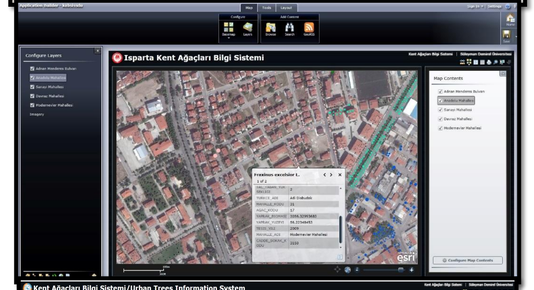
In UTIS, the transactions carried out to share of the information of the trees online are as follows;



The features of each tree in the study areas has been accessed online in UTIS web (http://kabsisdata.sdu.edu.tr/)

- In ArcGIS database, neighborhoods, boulevards, urban parks and promenade layers in Arc Personal Geodatabase were transferred to Arcgis Server with ArcCatalog software.
- Created layers are transferred to ArcGIS server. Display settings are made in ArcGIS Desktop. Project file is organized.
- The project was shared with ArcGIS server
- The errors were checked in the service editor and the database was published with the publish command.
- Application settings have been made on ArcGIS Viewer for Silverlight for external access to the published database.
- These layers, which are in the database transferred to ArcGIS viewer for silverlight, are added to the map content so that they can be selected from outside.
- In addition to the layers added as a map content, a sharing screen has been prepared by making arrangements related to logo, theme, output image and colors. Users can open and close the boxes next to the layers in the map content, allowing them to quickly reach the desired neighborhood
- When the points representing city trees on the shared database are selected, the attribute data for them can be seen in the form of a pop-up menu (data given in the form of frames) or in the form of an attribute table (data at the bottom).
- Other tree inventory information that is not shared is stored in the ArcGIS database. In case of sharing of these data, it is possible to open online data by sharing.





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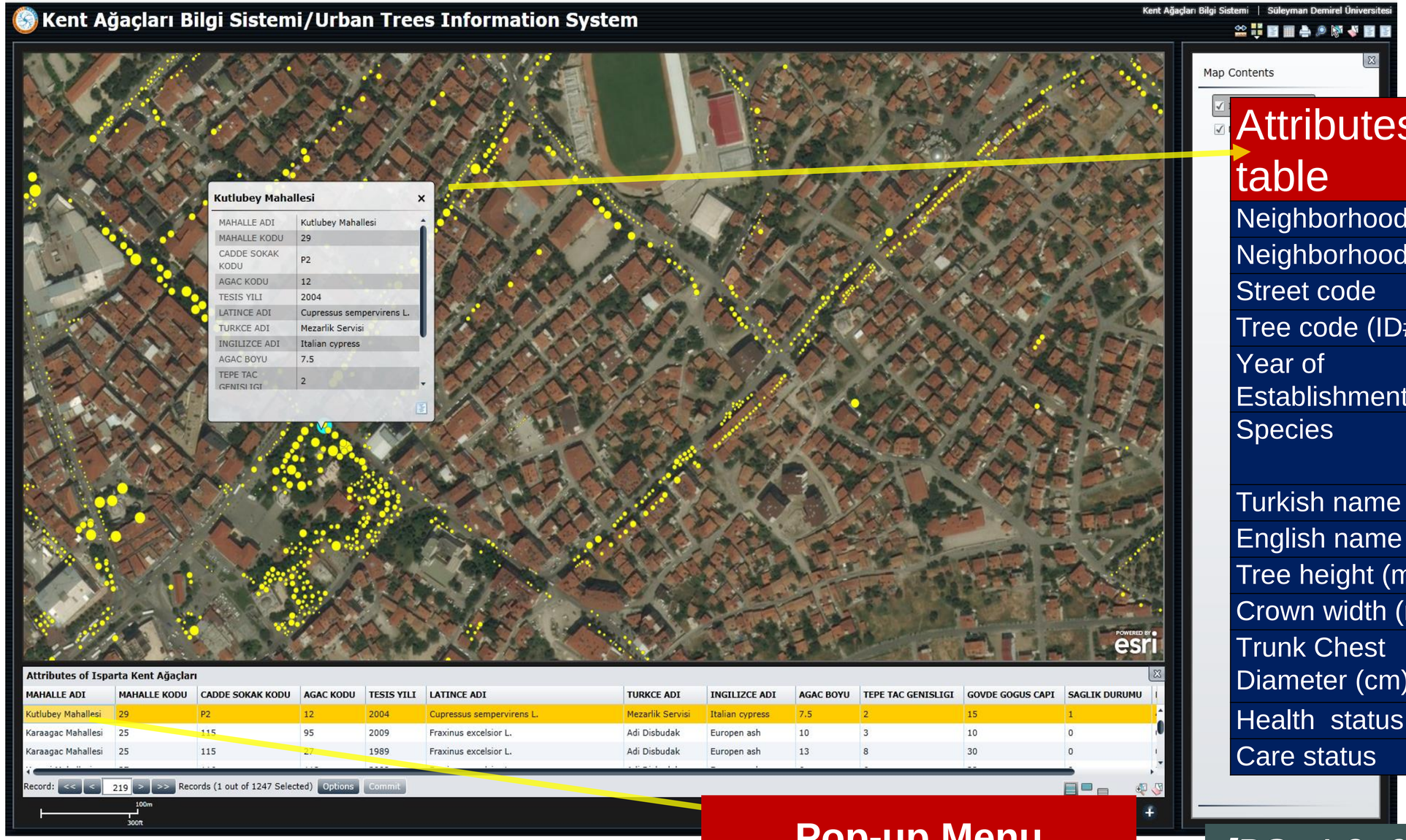
Online show



Attributes table	
Neighborhood name	Kutlubey
Neighborhood code	29
Street code	P2
Tree code (ID#)	12
Year of Establishment	2004
Species	Cupressus sempervirens L.
Turkish name	Mezarlık Servisi
English name	İtalian cypress
Tree height (m)	7,5
Crown width (m)	2
Trunk Chest Diameter (cm)	15
Health status	1
Care status	4

Pop-up Menu

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The advantages of Online Access of a ArcGIS-based Urban Trees Information Systems (UTIS) approach;

- Proposed UTIS approach is flexible, easily accessible, may be revised, can be improved, reusable, sustainable, adaptable, sharable, reliable, modular, compatible with other information systems, and cost-effective.
- Models also feature with fast and efficient operation.
- This may appear as digital of the features of all the individual and structural of the existing trees in urban and also provide to opportunities, assessment and interpretation.
- UTIS may integrate to urban information system and urban development plan. However, it helps to multipurpose urban decision making, the status determination and prepare to processes of planning and design.
- It can provide to multiple services for the creation of application programs and information includes tree planting, removal and protection for urban managers and planners.

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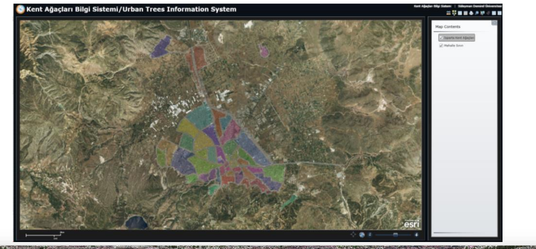
The advantages of Online Access of a ArcGIS-based Urban Trees Information Systems (UTIS) approach;

With the creation of information, system and online sharing with city trees, these benefits will be provided.

- All users can easily be reached via online sharing. They will have the opportunity to reach and analyze instant information by connecting with mobile phones and tablet easily.
- Sharing information online will enable scientific studies in different disciplines.
- For educational purposes (primary, secondary, high school and university students) will facilitate the study of the observation and examination of trees.
- It shall be the base for the tree planting, maintenance and protection programs to be made by the municipalities.
- It will enable the ecosystem and economic analyzes related to urban trees, such as the development of the city's air quality, Carbon Storage and Sequestration, building energy savings.
- Recognition of the accessibility of trees and their characteristics and understanding of the benefits to the city will contribute to the development of environmental protection awareness.
- It will be possible to make comparisons about the changes and developments between the past and present and future of the city's tree population.
- Sharing the individual information of the trees online will contribute to the sustainability and development of urban trees.



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NO TREES
NO FUTURE
IN CITY