

World Forum on
Urban Forests
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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

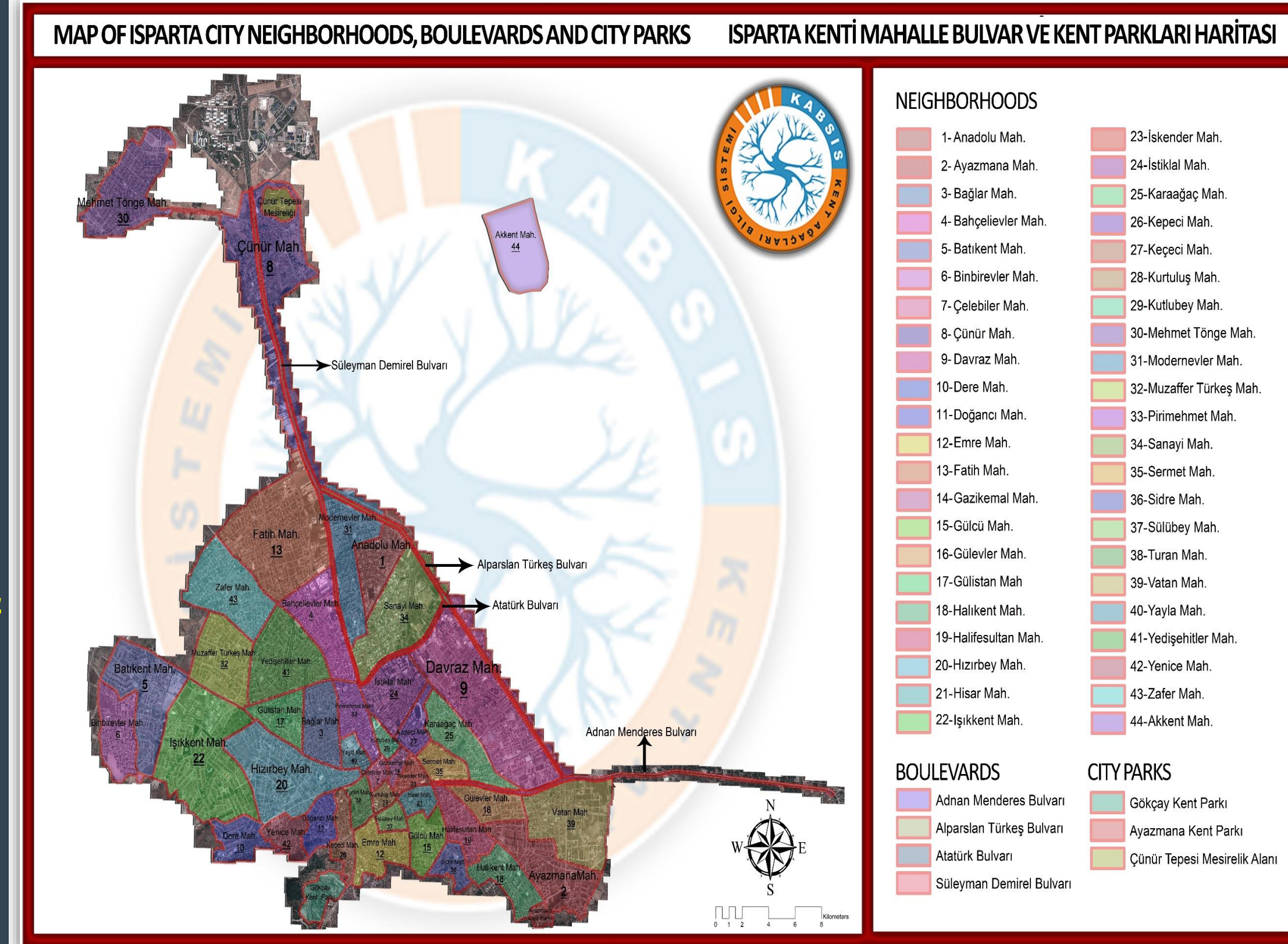
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Project Title : Urban Trees Information Systems (UTIS)

- 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.

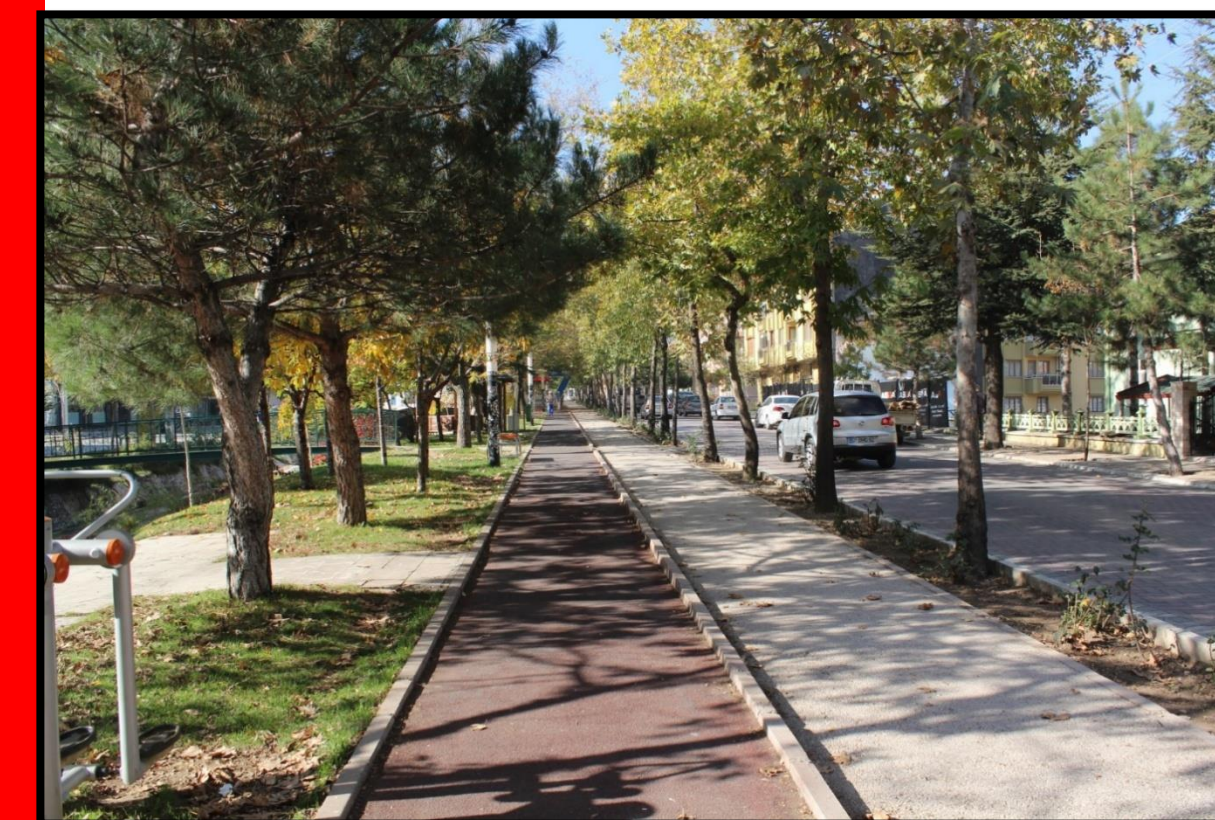


- Inventory data of existing trees in the parks, boulevards and streets in neighborhoods (43) , which have been responsible by Isparta Municipality, were obtained by measurements and observations of each tree in field survey works.



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.





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.



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





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>).






- 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.




URBAN TREES INFORMATION SYSTEM
Project Manager: Prof. Dr. Atilla GÜL

TREE INFORMATION FORM	
Species:	<i>Aesculus hippocastanum</i> L.
English	Horse chestnut
Turkish	Beyaz Çiçekli Atkestanesi
Family	Sapindaceae
Synonim	



Habitus	
General Habitus	It is a tree with a round top and a height of 20-30 meters. When young, the pyramidal tree takes a round form as it ages.

Botanical Characteristics	
Leaf	Leaves are long-stemmed, irradiated with 5-7 foliage and their edges are straight or flat. His handle is long. Leaf sequence mutual; the edges are straight or threaded.
Flower	Her flowers are a stag or drunkard. The compound is in the cluster organization. It is assembled around a long vertical axis. Her flowers are upright. In June, the fancy white flowers that cluster in the shape of a cluster clustered upwards. Each one is about 20 centimeters long. Yellow-red reflective and very decorative.
Fruit and Seed	The fruit is a large capsule with a barbed or flat. When prickly and green rind berries ripen and dark brown seeds fall. Only the deer can eat the fruits. They're so bitter, other animals don't like the taste.
Stem and Shoot	The bark of the body is reddish brown. There are thick and large branches. The buds that are bulky and bulging like the branches are also reddish brown.
Root	Makes pile root and develops strong side roots.
Other	It is a fast growing tree and therefore the wood is soft.

Ecological Characteristics	
Climate	Grows in warm, sunny and temperate climates. Resistant to cold climatic conditions.
Soil	It shows healthy growth in moist and permeable soils. It is a convincing species and makes its optimal development in normal, deep, fresh soil. He doesn't like salt soils. PH - 5-5-7,0 is optimal.
Altitude	It can also grow at high altitudes.
Water demands	There is moderate water and moisture demand.
Location	Grows naturally in the Balkan Peninsula. In our country is grown a lot.
Others	She doesn't need pruning much. Resistant to air pollution. Mass, park, shading and alle tree. Stem and branches are resistant to mechanical injuries and repair itself in a short time.

Varieties	
<i>Baumanni/Floerplena</i>	The pyramid of 20-25 m makes a hill. The leaves are 10-15 cm long, 5-7 pieces, dark green, flowers are folded, white and plenty of flower board is 15 cm long and upright, flowering time is long. It does not hold fruit, so it is suitable for traffic routes. Grows in deep, normal soils and sunny shade places. Park and alle tree or solitary is used.
<i>Pumila</i>	It's a scrub form.
<i>Pyramidalis</i>	Pyramid-shaped and pointed.
<i>Schirmkokeri</i>	Yellow-red flowers.
<i>Variegata</i>	Yellow variegated leaves.

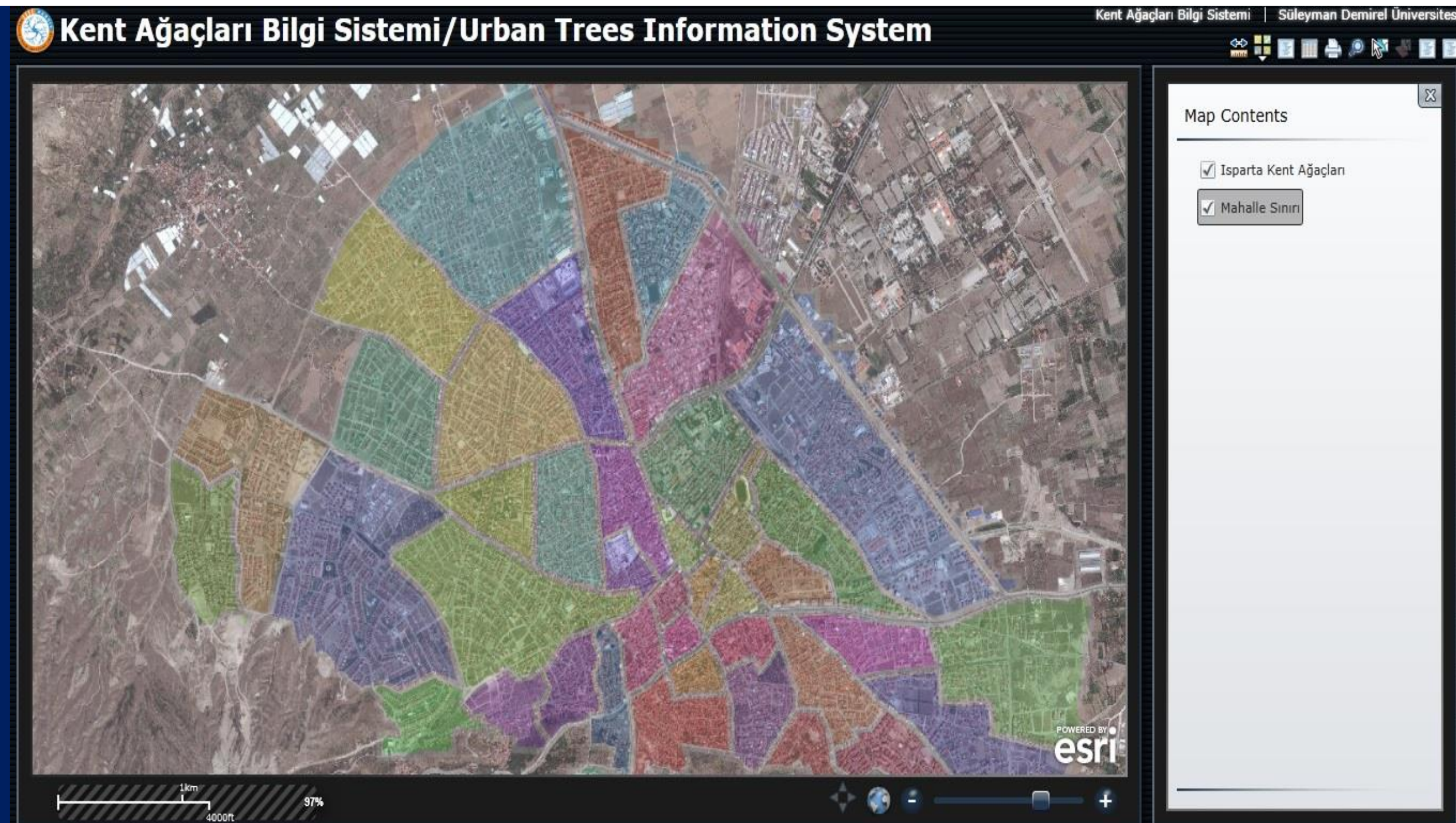
Using for Plant design	
Aesthetic	Because of its imposing appearance, it can be used as an accent tree in large areas. Flower color and form can be used for aesthetic purposes due to leaf form. It can be used solitary or in groups.
Functional	It has shadow effect. Especially ideal for pedestrian roads, square and park trees. Resistant to air



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.

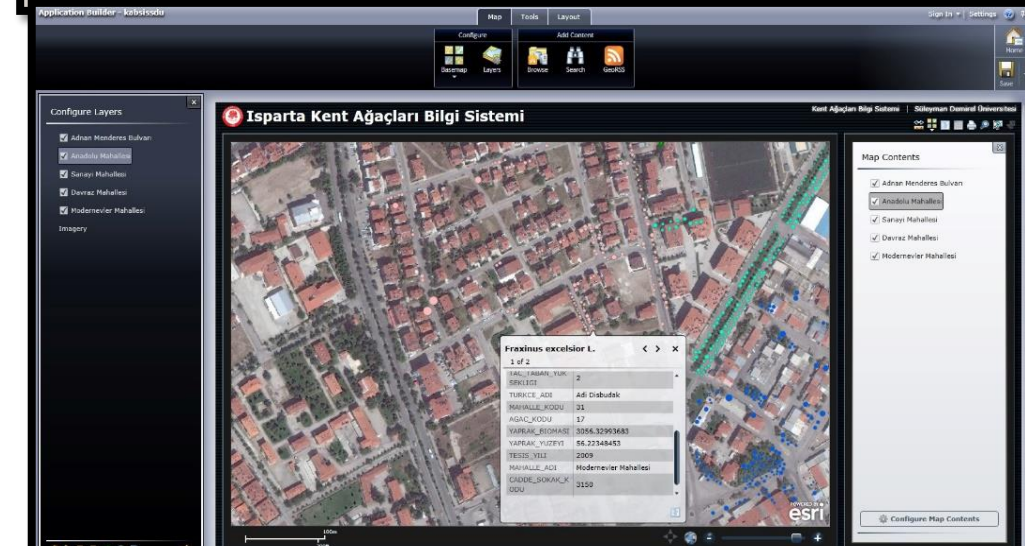
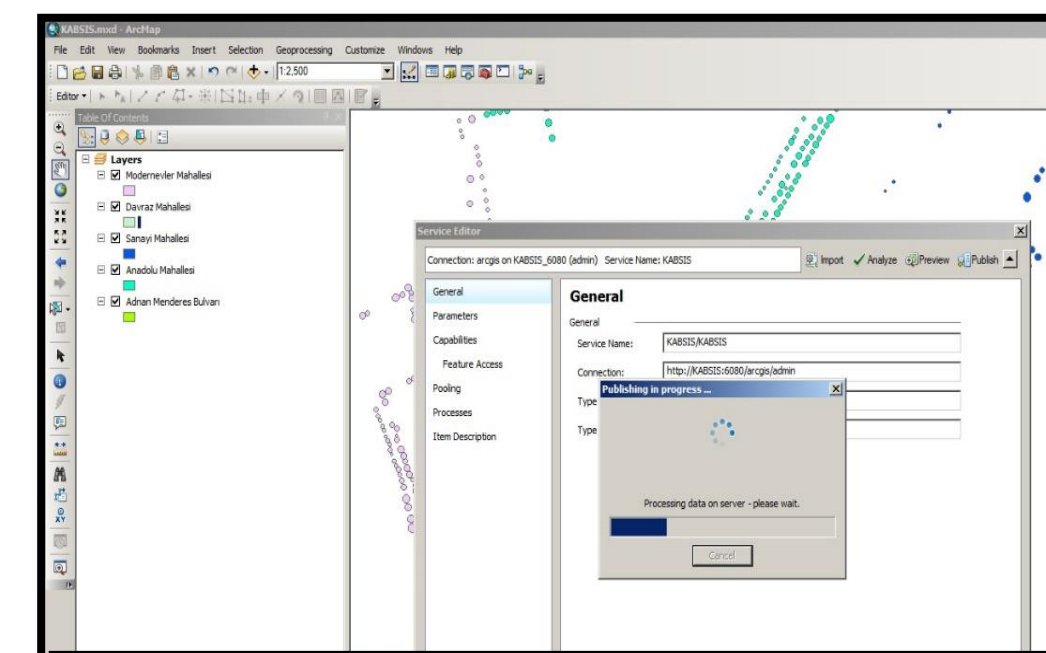
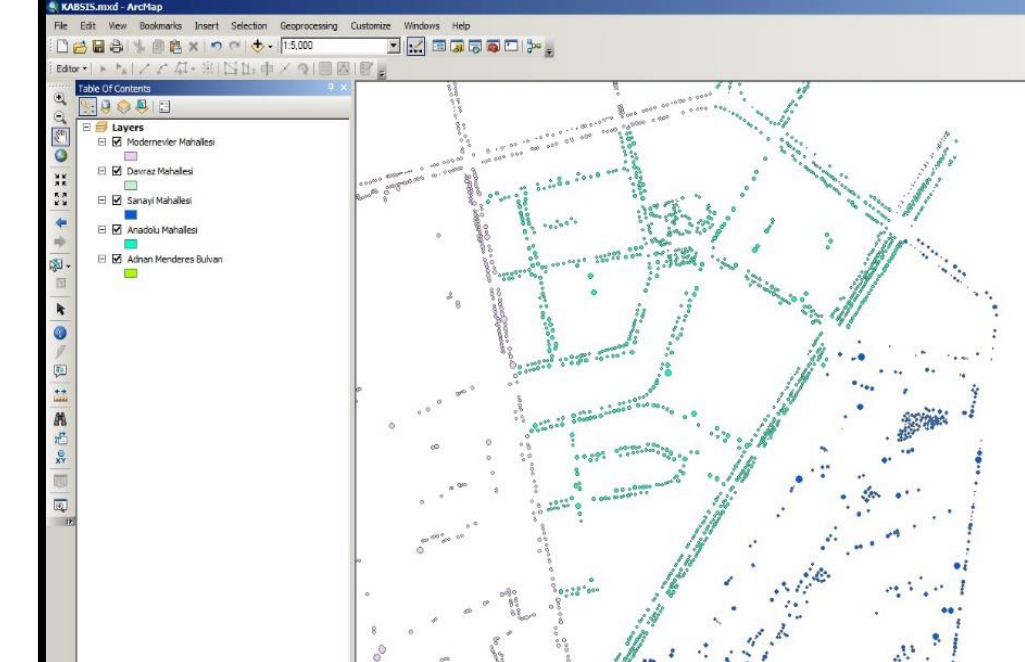




In UTIS, the transactions carried out to share of the information of the trees online are as follows;

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.





Online show

Kent Ağaçları Bilgi Sistemi/Urban Trees Information System

Kutlubey Mahallesi

MAHALLE ADI	Kutlubey Mahallesi
MAHALLE KODU	29
CADDE SOKAK KODU	P2
AGAC KODU	12
TESIS YILI	2004
LATINCE ADI	Cupressus sempervirens L.
TURKCE ADI	Mezarlık Servisi
INGILIZCE ADI	Italian cypress
AGAC BOYU	7,5
TEPE TAC GENISLIGI	2

Attributes of Isparta Kent Ağaçları

MAHALLE ADI	MAHALLE KODU	CADDE SOKAK KODU	AGAC KODU	TESIS YILI	LATINCE ADI	TURKCE ADI	INGILIZCE ADI	AGAC BOYU	TEPE TAC GENISLIGI	GOVDE GOGUS CAPI	SAGLIK DURUMU
Kutlubey Mahallesi	29	P2	12	2004	Cupressus sempervirens L.	Mezarlık Servisi	Italian cypress	7,5	2	15	1
Karaagac Mahallesi	25	115	95	2009	Fraxinus excelsior L.	Adi Disbudak	European ash	10	3	10	0
Karaagac Mahallesi	25	115	27	1989	Fraxinus excelsior L.	Adi Disbudak	European ash	13	8	30	0

Record: << < 219 > >> Records (1 out of 1247 Selected) Options Commit

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	Italian cypress
Tree height (m)	7,5
Crown width (m)	2
Trunk Chest Diameter (cm)	15
Health status	1
Care status	4

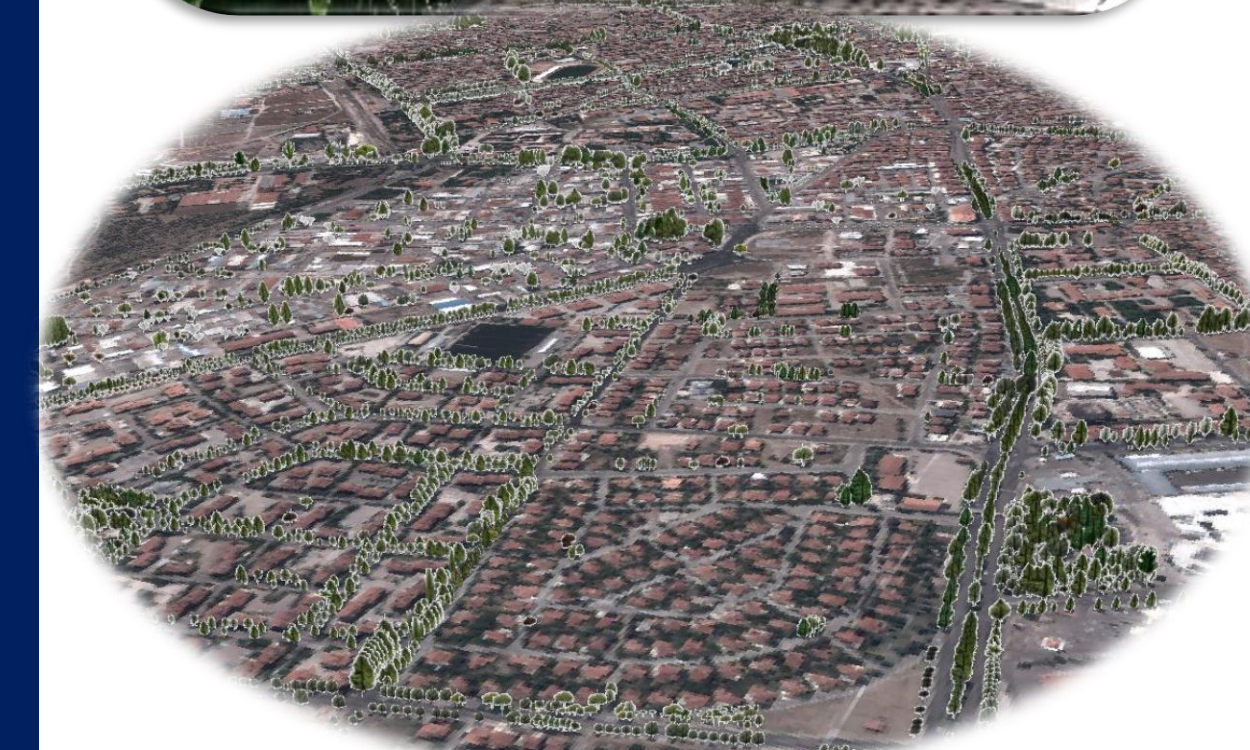
Pop-up Menu

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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.

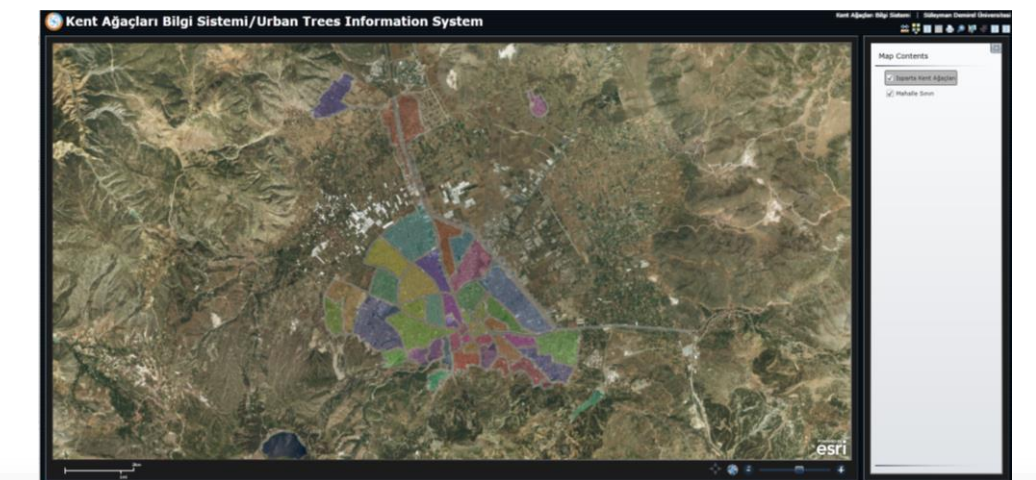




The advantages of Online Access of a ArcGIS-based Urban Trees Information Systems (UTIS) approach;

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**

