A web-based GIS application for cadastral forest map suspension

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Introduction

- Forestland mapping, along with ownership, known as forest cadastre, is an unaccomplished task for forestry in Greece.
- Absence of authorized cadastral forest maps in Greece over the years has raised many issues regarding land administration, state-private property rights and eventually sustainable management of forestlands.
- Cadastral forest mapping deals with forestlands boundary delineation and their associated characterization (forest/nonforest) based on the land-cover characteristics from multitemporal aerial remotely sensed data.
- In addition, it takes in account a plethora of existing data, such as administrative deeds issued by local Forest Services and historical cadastral or land distribution diagrams, to document the legal status of land (forest/nonforest).
The Forest Map

The Forest Map aims to:

1. Assessment and environmental protection of forestlands and
2. Identify and promote state property rights on forestlands through cadastral process.

KTIMATOLOGIO S.A. the leading Greek government company, responsible for the development of national cadastre in Greece, has launched an ambitious program to implement cadastral forest mapping at the national scale till 2020.

Cadastre development comprises of all land properties, and therefore cadastral forest mapping is necessary for a successful cadastre establishment.
Forest Maps Progress in Greece (June 2012)

LEGEND

- Areas with completed Forest Maps (9.8%)
- Program 1: Areas under implementation (27.6%)
- Program 2: Areas under procurement (22.7%)
- Areas with no Forest Maps (39.9%)
The Forest Map

Δ: Forestlands
A: Other areas
Process of Forest Map Ratification

1. Forest Map design & production
2. Quality control of Forest Map data
3. Import of forest map data into SQL server using ArcSDE technology
4. Validation of applied topological rules
5. Forest Map Suspension (electronic) using Web Services

Through the whole process, ESRI technology and custom applications are mostly used.
Forest Map Suspension

The recent institutional provisions on cadastral forest mapping require wide public (electronic and analogue) notification for Forest Map geospatial content, digital objections registration, spatial boundaries of objections and payment of the corresponding special fee. In other words:

- Forest maps in www and
- Digital objections via internet.
- Establishment of Forest Map Suspension Office.

Objections must include the following elements:

1. Geographic coordinates enclosing the objection area,
2. Facts supporting the legitimate interests, and
3. Facts certifying the payment of the corresponding special fee.
Application Data Categories

**Descriptive data**
- Objections
- Beneficiaries
- Legal facts
- Petitions

**Spatial data**
- Municipality Boundaries
- Urban plans and settlements boundaries
- Administrative deads of local forest offices
- Forestlands boundaries and land status (forest/non forest)
- Orthophotos
- Geographic coordinates of objection’s area according to objections
Web Application for Electronic Objection Submission

Sign In into the web Application*

Provide personal data

Delineate the area of objection

Use spatial tools for editing and querying

Provide data about the objection

Pay fee according to the objection’s calculated area

Submit the objection

* The web Application was created using .NET framework
Web Application for Electronic Objection Submission

Sign in of new user

Username: 
Password: 
Verify Password: 
Email: 
Security Question: 
Security answer: 

Create User

Your account has been successfully created! You will soon receive a message with instructions at your email address.
You are at the main page of Objections against Forest Map content.

For your convenience, please use the menu above, using “Help” when necessary. It is important to read the Instructions carefully to avoid mistakes.
Input of Legal or Physical Personal Data

<table>
<thead>
<tr>
<th>Personal Data</th>
<th>Objections against Forest Map content</th>
<th>Help</th>
<th>FAQ</th>
<th>EXIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>All data below must be in Capital Greek or Latin characters! Attention! Data with * are necessary to proceed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Surname</strong></td>
<td><strong>Name</strong></td>
<td><strong>Tax Num.</strong></td>
<td><strong>Married</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Place of birth</strong></td>
<td><strong>Date of birth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ID Number/Passport</strong></td>
<td><strong>Date of Issue</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of Issuer</strong></td>
<td><strong>Name of Issuer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Father Surname</strong></td>
<td><strong>Father Name</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mother Surname</strong></td>
<td><strong>Mother Name</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spouse Surname</strong></td>
<td><strong>Spouse Name</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Street</strong></td>
<td>From</td>
<td>To</td>
<td><strong>ZIP cod</strong></td>
<td><strong>Foreign Residence</strong></td>
</tr>
<tr>
<td><strong>City</strong></td>
<td><strong>Area</strong></td>
<td><strong>Country</strong></td>
<td>Choose</td>
<td></td>
</tr>
<tr>
<td><strong>Phone Number</strong></td>
<td><strong>Mobile</strong></td>
<td><strong>Fax</strong></td>
<td><strong>Email</strong></td>
<td></td>
</tr>
<tr>
<td>Do you wish to contact you at the above email address?</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Save
Graphical Interface – Spatial Delineation of Objection’s Area
Site Searching Queries

**Queries**
Zoom in an area by address, coordinates or cadastral polygon ID

**Upload polygons**
By ASCII DXF (AutoCad) files or by ASCII text files
Forest Map Area of Interest

FOREST MAP SUSPENSION
Web Application’s Spatial Tools

Navigation tools
- Measure
- Create polygon
- Select polygon
- Delete polygon

Information tools
- Report of created polygon
- Coordinates of polygon
- Info about land status (forestland or other)
- Scale

Advantages:
- Responsive and reliable
- Specific designed for area delineation
- Ease of use

All tools were created using Javascript API
Spatial Delineation of Objection’s Area

The delineated objection’s boundary marked with yellow.
Spatial Delineation of Objection’s Area (movie)

FOREST MAP SUSPENSION
Objection’s Data Submission

### Objection against Forest Map content

The polygon for which you are about to appeal is located in the Municipality of: MARATHONAS

To see the boundaries of the polygon you are about to appeal you may navigate the Forest Map:

<table>
<thead>
<tr>
<th>Objection:</th>
<th>SUBMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objection’s code</td>
<td>500</td>
</tr>
<tr>
<td>Municipality:</td>
<td>MARATHONAS</td>
</tr>
<tr>
<td>Protocol number:</td>
<td>1</td>
</tr>
<tr>
<td>Date:</td>
<td>16/4/2011</td>
</tr>
<tr>
<td>Name:</td>
<td>POLAKIS ANDREAS</td>
</tr>
</tbody>
</table>

#### A.2 Personal data

<table>
<thead>
<tr>
<th>Type</th>
<th>Surname</th>
<th>Name</th>
<th>Father Name</th>
<th>ID Num</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΠΟΛΑΚΙΣ</td>
<td>ΑΝΔΡΕΑΣ</td>
<td>ΕΛΕΥΘΕΡΙΟΣ</td>
<td>Α1624271</td>
</tr>
</tbody>
</table>

#### B. Data of the area of the objection

**Site:**

Φτεζ : ΚΑΤΟΥΝΤΑΣΤΕΙΑ Μ ΤΕΙΝ ΚΑΡΤΖΙΟΥ

#### C. Foundation of legal interest

I hereby declare my right to appeal through:

- Real right:
- Contractual right:
- Natural environment protection:
- Other:

1. Είμαι ιδιοκτήτης του σχετικού οικισμού με όνομα τίτλο με αρ. 4980/2-10-2001 συμβολισμένου Μαραθώνα Στ. Γ. Ηπατία και Βενεσία Μαραθώνα στο Υποθηκολογείο Μαραθώνας
Special Fee Payment

- The amount of the corresponding special fee depends on the objection’s area.
- The objection’s area and fee is calculated automatically by the application.

We provide different options for payment:
- at the bank, providing the cashier with an ID which is printed by the system. The transaction is automatically checked and in the next day the objection’s status is validated.
- by a credit or debit card.
- using an automated payments machine.
Proof of Objections’ Submission

Municipality: Marathonas
Protocol number: 26
Date: 30/04/2011
Perfection area: Attica
Site: Avra

Proof of objection against forest map content

Data of person submitting the objection

A.1.1 Personal Data
Surname: Mpakirli
Name: Maria
Father’s name: Athanasios
AFM: 106717770
Name’s code: 0000000000091886

Payment data
Fee: 50€

<table>
<thead>
<tr>
<th>Code</th>
<th>Bank</th>
<th>Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>78000000057200140125</td>
<td>National Bank of Greece</td>
<td>27/04/2011</td>
<td>50.00</td>
</tr>
</tbody>
</table>

The proof document is valid only if the fee has been paid.

Objection’s polygon data

<table>
<thead>
<tr>
<th>Vertices</th>
<th>Coordinates</th>
<th>Area (sq. meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>423202425</td>
<td>001.52</td>
</tr>
<tr>
<td>A2</td>
<td>423202425</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>423202425</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>423202425</td>
<td></td>
</tr>
</tbody>
</table>

Map of area
## Application’s Queries

<table>
<thead>
<tr>
<th>Personal Data</th>
<th>Objections against Forest Map content</th>
<th>Help</th>
<th>FAQ</th>
<th>Contact</th>
</tr>
</thead>
</table>

### OBJECTION’S QUERIES

- **TAX NUMBER:**
- **ID NUM/Passport:**
- **LASTNAME:**
- **NAME:**
- **ID CODE:**
- **Protocol Number:**
- **Father’s Name:**
- **Municipality:**
- **Objection’s status:**
  - Test
  - Temporal
  - Submitted
- **Way of submission:**
  - Internet
  - Office
  - KEP
- **Quality control:**
  - No quality control
  - Omissions in submitted documents
  - No error in submitted documents
  - Error in submitted documents
- **Submission date from:**
- **to:**
- **Date of data entry:**
  - 01/01/2011
  - 29/06/2011
- **Paid:**
- **Paid through:**
- **Submitted documents:**
- **Invoice send:**
- **Post date from:**
- **to:**

**NEXT**
Post Processing of Submitted Data

Quality Checks:

- Check consistency of area of polygon with fee payments
- Check spatial extent of objections’ area
- Check of objections’ location
- Check existence of required legal documents,
- Check additional legal documents if needed

Contact corresponding citizens
All objections data along with the accompanied documents and land owner’s data are sent to an independent committee for approval or rejection.

Based on its decision, the final Forest Map is developed.
Conclusions

1. The use of GIS technology and web mapping has significantly accelerate the process of Forest Mapping, make public access, information and participation a reality.
2. The web application, reduced the submitted objections in analogue form by 30%. In addition, thousands of people were able to access Forest Map geospatial content via internet, saving time and cost.
3. ESRI technology along with customized applications, where necessary, allowed us to provide valuable information to public, store, file, retrieve, and process the related data and documents systematically and fast.
4. The whole process of Forest Map suspension using the web application should be applied exclusively at the national scale.
Thank you for your attention