An application of GIS technologies for rational use of agricultural land

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SUSU is a university which unites Europe and Asia
Geoportal for Chelyabinsk Region

currently having 1470 digital layers
Agricultural Regions

- 88.5 million hectares - total area of the region
- 2.9 million hectares - the arable land area
- 1.9 million hectares - total size of the sown areas
Strategy for Agricultural Development of the Region

• an increase in the production of grain crops;
• introduction of neglected fields into the circulation;
• new markets finding;
• introduction into production innovative technologies.
Integration of global GIS trends in the development of the geoportal

- precision farming;
- GPS and GLONASS navigation;
- information and communication technologies;
- wireless accounting technologies.
Competitive advantage: adaptation for government, agro corporations and farmers

with a subsystem of user access control
Competitive advantage: unaccounted agriculture fields
Competitive advantage: quality control and automated calculation of processed area
**Competitive advantage:** creation of a new data using combination of existing data

Field maps from satellite imagery

Cadastral maps from government

Unaccounted fields
Competitive advantage: One Access Point
Sources of trustworthy information

Machinery

Satellites

Archive Maps

UAVs

Government

GEOPORTAL
Role of UAV in Agriculture

Survey area per day - up to 1200 hectares,
for 1 hour - 250-300 hectares;
the height of the flight is from 100 to 300 m, with a spatial resolution - up to 1 cm in pixel;
the result is relevant maps in scale 1:150, 1:300, 1:500;
Key results achieved by the application of geotechnologies:

- creation of the relevant digital maps of fields;
- identification of unaccounted land;
- identification of unused land;
- creation of a map-schemes of the vegetation state
Key results achieved by the application of geotechnologies: map-schemes of the vegetation state.

Saving fertilizers in the farm was 20%, and an increase in the yield of 10%.
Key results achieved by the application of geotechnologies:
Elevation Model for Plowing Optimization
Key results achieved by the application of geotechnologies: maps for determining the size and types of erosion
Key results achieved by the application of geotechnologies: maps of overgrown fields
Online monitoring of the of agricultural machinery work
Decrease of average fuel consumption for machinery

online display of fuel consumption, level and machinery speed
Determining the quality of performing agrotechnological operations

area of skipped land during field processing
Determining the actually processed area by means RFID devices

Automated determination of current equipment by means of equipment is determined by means of equipment.

Wireless accounting technology is used.

Technological operation is determined by means of equipment.

Ploowing

Seeding

Seeding

Harrow

Harrowing
Achieved results for the region and for individual farms

<table>
<thead>
<tr>
<th>Area</th>
<th>Economical Efficiency</th>
</tr>
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<tbody>
<tr>
<td>Total land area of 4 districts</td>
<td></td>
</tr>
<tr>
<td>1 430 000 ha</td>
<td></td>
</tr>
<tr>
<td>Total area of agricultural land</td>
<td></td>
</tr>
<tr>
<td>700 000 ha</td>
<td></td>
</tr>
<tr>
<td>Unaccounted agricultural land</td>
<td>41 600 000 rubles/year (tax and rent)</td>
</tr>
<tr>
<td>260 000 ha</td>
<td></td>
</tr>
<tr>
<td>Abandoned agricultural land</td>
<td>136 000 000 rubles (grant)</td>
</tr>
<tr>
<td>136 000 ha</td>
<td></td>
</tr>
<tr>
<td>Eroded agricultural land</td>
<td>18 162 400 rubles (penalty)</td>
</tr>
<tr>
<td>14 600 ha</td>
<td></td>
</tr>
<tr>
<td>Overgrown agricultural land</td>
<td>10 698 400 rubles (penalty)</td>
</tr>
<tr>
<td>8 600 ha</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>206 460 800 rubles</strong></td>
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Prospects for the development and usefulness of the geoportal subsystem for agricultural monitoring

• development of complex regional agglomerational zoning with by means of the geoportal subsystem;

• online service for farmers, aimed at the final stage in the chain of agricultural production
Monitoring of the whole cycle of agricultural production by means of geoportal