Overview of soil information and soil protection policies in Bulgaria

Dr. Milena Kercheva
Assoc. Prof. Dr. Veneta Krasteva

N.Poushkarov Institute of Soil Science,
7, Shosse Bankya str., Sofia 1080, Bulgaria

E-mail: mkercheva@abv.bg; vnkrasteva@abv.bg
http://www.iss-poushkarov.bg
Institutions with activities concerning soil resources and soil protection in Bulgaria

- Ministry of Agriculture and Forestry
  - N. Poushkarov Institute of Soil Science
  - Soil Resources Agency (SRA)
- Ministry of Environment and Water (MEW)
  - Executive Environment Agency
  - Regional Environment Agencies
- Nongovernmental organizations
  - Bulgarian Soil Science Society
  - Bulgarian Humic Substances Society
  - Bulgarian Soil Tillage Research Society
• **Large scale soil survey** at scales **1:25000** (since 1956 year) and **1:10000** (since 1971 year) – soil maps and reports for the cooperative farms with profiles (about 50000 for the whole country) information for:
  - Soil profile morphological description;
  - Soil particle size distribution and texture classes (pipette method, Katchinski, 1956)
  - **pH in KCl** (1:2.5 soil 1N KCl extract, pH meter);
  - Organic matter content (method of Tjurin, 1965)
  - Total amount of nitrogen (method of Kieldal)
  - Total amount of phosphorus (method of Ginsburg)
  - Calcium carbonates (method of Shaibler)

• **Soil agrochemical survey** at scale **1:25000** of arable lands:
  - Total and available forms of macro and microelements

• **Soil maps of the whole territory of Bulgaria:**
  - **1: 500 000** (Poushkarov et al., 1931)
  - **1: 200 000** (Koinov, Tanov, 1956)
  - **1: 400 000** (Koinov et al., 1968; last digital ver., 2002 by SRA)
  - **1:1000 000** (Koinov et al., 1973; Boyadjiev, 1994; digital ver. 1994 by INRA – BG coordinator I. Kolchakov)
Georeferencing of soil profiles from 67 soil reports of West part of Danube plain

(scale 1:10000)
Soil map of Bulgaria

Soil Geographical database of Europe at scale 1:1 000 000 (1994–1998), INRA, ESB, BG coordinator Prof. I. Kolchakov
• Large scale survey at scales 1:5000, 1:1000 of soils with particular problems – salinisation, pollution with heavy metals, oil products, radionuclides or pesticides

• Analytical data for physical, hydrological, chemical, physico-chemical characteristics of the main soil units collected in monographs, habilitation theses, project research reports. Specific databases have been developed on:
  – atmosphere-plant-soil-groundwater continuum;
  – soil physical properties;
  – soil hydraulic properties;
  – organic carbon stocks;
  – field plots for soil erosion studies;
  – subsoil compaction – literature, experiments and results, etc.

• Long-term field experimental data from different agroecological regions concerning:
  – Management water and nutrient cycles for improvement of soil fertility
  – Conservation agricultural practices for soil degradation prevention
  – Remediation of degraded lands
Extent (da) of soil salinization (Popandova, Kavardjiev, Teoharov, 2006)
Recent applications of soil information

- Land evaluation
- Assessment of soil physical and chemical degradation

Creating input databases for the simulation models, environment and crop productivity risk assessments, etc.

Integration in European soil databases projects:
- SOTER, SOVEUR, Danube project, ENVASSO, SPADE2
Digital soil map of Silistra region, scale 1:10000
Suitability of agricultural lands in the region of Silistra for apricots growth (Georgiev, 2005)

Based on estimates of:
- Soil texture
- Depth of A horizon
- Soil depth
- Texture differentiation
- Soil pH
- Humus
- Groundwater level
- Soil erosion/accumulation
- Soil alkalinity/salinity
- Stoniness
- Swampiness
- Climate
Map of soil susceptibility to water erosion for the territory of Bulgaria, scale 1:1000 000 (Rousseva, Stefanova, 2005)
Assessment the aeration status of soils using the experimental data and calculated reference bulk density's values

The optimal, critical and limiting values of bulk density were calculated at 20/15%, 10% and 5% drainage-aeration pores, respectively, using experimental data for particle density and field capacity.

\[
\text{BD}_{\text{opt,crit,lim}} = \frac{(100 - A\text{P}_{\text{opt,crit,lim}})d_s}{100 + FC_{w.d_s}}
\]
For each textural class of A and B horizons regression equations between the calculated reference bulk density values and humus and clay content (<0.001mm) were found, which could be useful when field capacity and soil particle density data missed.

<table>
<thead>
<tr>
<th>Clay&lt;0.01, %</th>
<th>FC, %w/w</th>
<th>R²</th>
<th>SEE</th>
<th>BD&lt;sub&gt;crit&lt;/sub&gt; g/cm³</th>
<th>R²</th>
<th>SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humic horizons: A, A₁A₂, A₂</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10-30</td>
<td>6.7+8.9hum</td>
<td>91.1</td>
<td>2.9</td>
<td>1.97-0.27.hum</td>
<td>86.1</td>
<td>0.10</td>
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<tr>
<td>30-45</td>
<td>14.5+5.5hum</td>
<td>70.5</td>
<td>4.7</td>
<td>1.67-0.12.hum</td>
<td>75.6</td>
<td>0.06</td>
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<tr>
<td>45-75</td>
<td>11.6+3.5.hum+0.32cl&lt;sub&gt;1&lt;/sub&gt;</td>
<td>72.0</td>
<td>3.9</td>
<td>1.68-0.07.hum-0.005 cl&lt;sub&gt;1&lt;/sub&gt;</td>
<td>73.1</td>
<td>0.07</td>
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<tr>
<td>Illuvial horizons: B</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-45</td>
<td>19.4+5.9hum</td>
<td>71.8</td>
<td>1.2</td>
<td>1.60-0.14.hum</td>
<td>72</td>
<td>0.03</td>
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<tr>
<td>45-60</td>
<td>10.0+0.44cl&lt;sub&gt;1&lt;/sub&gt;</td>
<td>43.0</td>
<td>3.2</td>
<td>1.80-0.010 cl&lt;sub&gt;1&lt;/sub&gt;</td>
<td>39</td>
<td>0.06</td>
</tr>
<tr>
<td>60-75</td>
<td>-10.5+0.86cl&lt;sub&gt;1&lt;/sub&gt;</td>
<td>40.3</td>
<td>4.9</td>
<td>2.17-0.017 cl&lt;sub&gt;1&lt;/sub&gt;</td>
<td>39</td>
<td>0.09</td>
</tr>
</tbody>
</table>
N. Poushkarov Institute of Soil Science
Ministry of Environment and Water
Joint projects

- “Overview, assessment and recommendation for re-organization of soil monitoring grid” 2003, coordinator N. Dinev
- “Development and implementation of a soil monitoring and assessment for the Republic of Bulgaria” 2004
National System for Environmental Monitoring Control and Soil Protection

Objectives

- Control and soil protection from heavy metal (Zn, Cu, Pb, Cd, As) pollution
- Control and soil protection from organic pollutants (PAH, PCB and pesticides)
- Control and soil protection from acidification
- Control and soil protection from salinization
- Control and soil protection from erosion

Grid - 16x16 km (446 points)
Monitoring points of MEW on 16x16 km grid, West Danube plain
Authorized for:

• Maintaining the country’s digital map of soil cover and agricultural land evaluation

• Soil survey and actualizing the soil information for the purposes of re-categorization of lands, investment projects, etc.
Legislation

- Law for agricultural lands protection
- Law for property and use of agricultural lands
- Norms for permissible content of substances in the soil (Regulation No3, 1979, 1997)
- Law for environment protection - (last changes and additions, 2005)
- Law for soil (under consideration) - 
  - Responsible government institutions on national level:
    - Ministry of environment and water - national program for soil protection, sustainable soil use and soil restoration
    - Ministry of health - assessment of health risk
    - Ministry of regional development and public works - monitoring and geo-protection from erosion and landslides
  - Responsible institutions on regional level – mayor
Recent conferences devoted to soil protection

National conference with international participation "90 Years Soil Science in Bulgaria" - 2001, Sofia
First national conference on humus substances and soil tillage, 2000, Borovetz
Second national conference with international participation on humus substances, 2004, Borovetz
National conference with international participation "Management, use and protection of soil resources" 2005, Sofia