Overview of Soil Information and Soil Protection in Albania

Sherif Lushaj
Pandi Zdruli
Introduction

- Agriculture in Albania provides about 25% of the Gross Domestic Product (GDP) and still remains an important sector of the economy;

- During the 1998-2004 period, the growth of agricultural production has ranged from 5 to 8% annually;

- The overall country’s territory of 2,874,800 ha, is divided between:
  - agricultural land with 24.4%, (699,500 ha);
  - forests with 36.9%, (1,062,770 ha);
  - pastures and meadows with 14.4%, (414,517 ha);
  - other land uses with 24.3% (699,013 ha).

- The agricultural land surface per capita is about 0.21 ha.
Land use structure

- Agriculture land: 24.3%
- Forests: 24.4%
- Pasture and Meadows: 36.9%
- Other land: 14.4%
History of the Land Reform

• The agrarian reform was completed in 1946;

• The collectivization of agriculture was completed during the 1946-1968 period;

• Until 1990, Albanian Law defined all the land as state property. During this period, 700,000 ha of agricultural land was managed by 77 state farms and 415 by agricultural cooperatives;

• From 1990 to 2004, 564,000 ha of the agricultural land was privatized and as result about 450,000 private farms were established with an average size of 1.3 ha;

• Forests are divided between state with 73 %, communes with 26%, and private with 1%.
Soil Classification

- From the 1950 to 1990, soil classification was based on elevation, climatic conditions and natural vegetation, adapted from Russian Soil Classification.

- The first soil map on 1:200,000 scale became available in 1958. From 1970 to 1990, detailed soil maps of 1:10,000 and 1:50,000 were prepared for each agricultural cooperative, state farm and district.

- These soil surveys were used for planning of agricultural practices and technologies.

- According to National Soil Classification System (NSCS), soils are divided in four belts based on climate differences, natural vegetation, elevation, slope, soil formation factors, and their physical and chemical properties.
Albanian Soil Classification and the International System

- After the 1990 in order to unify the Albanian Soil Classification with the International System, the Soil Sciences Institute (SSI) of Albania in cooperation with Soil European Bureau, developed the pedological map on 1:1 million scale.

- The map was included in the European map.

- The SSI in cooperation with Mediterranean Agronomic Institute (IAM) in Bari, carried out a study and prepared the pedological map on 1:250,000 scale for the overall area and a map on 1:50,000 scale for the coastal area.
Most of Albania’s soils are classified as Cambisols, Luvisols, Regosols, Leptosols, Phaeozems) and in the western coastal areas as Fluvisols.

Source: Zdruli et al, 2002
Main soil pedons of Albania

- Cambisols: 30.6%
- Phaeozems: 10.5%
- Luvisols: 25.3%
- Regosols: 13.2%
Soil Texture Distribution

- Loamy soil 50%;
- Clayey soil 30%;
- Sandy soil 20%.
Soil Depth Distribution

- Deep soils dominate on the flat coastal areas;
- Shallow soils dominate on hilly and mountainous area.
## Soil Potential (I)

<table>
<thead>
<tr>
<th>No.</th>
<th>Level</th>
<th>Humus (%)</th>
<th>Total Nitrogen (mg kg⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Arable land (%)</td>
<td>Range</td>
</tr>
<tr>
<td>1.</td>
<td>Low</td>
<td>44.6</td>
<td>&lt;1.5</td>
</tr>
<tr>
<td>2.</td>
<td>Medium</td>
<td>45.6</td>
<td>1.5-3</td>
</tr>
<tr>
<td>3.</td>
<td>High</td>
<td>9.8</td>
<td>&gt;3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: SSI

- Until 1990, soil fertility was monitored in all agricultural land every 4 to 5 years;
- Data show that:
  - 44.6 % of soils are classified as low in humus content located mainly in the hilly and mountainous area and partly in the western flat areas;
  - 78 % of soils are classified as low and medium in total N.
## Soil Potential (II)

<table>
<thead>
<tr>
<th>No.</th>
<th>Level</th>
<th>Available P (mg 100 g⁻¹)</th>
<th>Available K (mg 100 g⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Arable land (%)</td>
<td>Range</td>
</tr>
<tr>
<td>1.</td>
<td>Low</td>
<td>33.0</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Medium</td>
<td>41.6</td>
<td>1-2</td>
</tr>
<tr>
<td>3.</td>
<td>High</td>
<td>25.4</td>
<td>&gt;2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: SSI

- 75% of soils are classified as low and medium in P;
- More than 90% of the soils are classified as high and medium in K.
Structure of field crops
(Before the 1990)

Cereals: 48.6%, 48%
Orchards: 17.1%, 17%
Forage: 13.5%, 14%
Industrial crops: 12.2%, 12%
Vegetables: 4.7%, 5%
Patoes and beans: 4%, 4%
Land Fragmentation in Albania

- The land privatisation decreased the farm size:
  - 58% of the farms are less than 1 ha;
  - 30% of the farms vary between 1-2 ha;
  - 12% of the farms are greater than 2 ha.

- Farmers are using different management practices which has created differences in the amount of fertilisers leading to reduced levels of soil fertility.
Land consolidation

The Albanian Government considers land consolidation as a strategic priority that should lead to the development of a land market based on land suitability and evaluation, enhance cooperation between farmers, land exchange, and other consolidations forms.
Soil classes distribution

Class I: 1%
Class II: 6%
Class III: 19%
Class IV: 19%
Class V: 17%
Class VI: 15%
Class VII: 12%
Class VIII: 7%
Class IX: 3%
Class X: 1%

Source: SSI
Future Trends

- Land suitability is used as a tool in Land Use Planning.

- A land suitability study has been conducted based on:
  - Climate;
  - Site characteristics;
  - Soil characteristics.

- Based on the methodology used by FAO (Framework for Land Evaluation - Soils Bulletin 32, FAO, 1976) land was divided into 5 classes (S1 – S4 suitable and N not suitable for agriculture);

- Also a detailed database of soil resources based on GIS was created.
Case Study

Source: SSI
Soil maps series

Preza Komune

Source: SSI
DEM & Slope map

Preza Komune

Source: SSI
Watershed analysis

Preza Komune

Source: SSI
Land use zoning

Preza Komune

Source: SSI
Land Use Plan, Preza commune

Short Term

Medium Term

Source: SSI
Land Degradation

Soil erosion & pollution
### Experimental sites

<table>
<thead>
<tr>
<th>Nr</th>
<th>Experimental sites</th>
<th>Soil loss by erosion (tons ha⁻¹ year⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Without plant</td>
</tr>
<tr>
<td>1.</td>
<td>Korce</td>
<td>20.7</td>
</tr>
<tr>
<td>2.</td>
<td>Vlore</td>
<td>31.2</td>
</tr>
<tr>
<td>3.</td>
<td>Lezhe</td>
<td>29.3</td>
</tr>
<tr>
<td>4.</td>
<td>Tirane</td>
<td>25.9</td>
</tr>
<tr>
<td>5.</td>
<td>Mallakaster</td>
<td>33.3</td>
</tr>
<tr>
<td>6.</td>
<td>Librazhd</td>
<td>21.4</td>
</tr>
</tbody>
</table>
Factors of Soil Erosion in Albania

- Rainfall;
- Land cover;
- Slope;
- Average altitude;
- River network;
- Deforestation and overgrazing;
- Investments.
The major controlling soil erosion factors in Albania area: Total rain fall that varies between 900 and 1800 mm/year; Lack of vegetation cover and rapid increase of bare areas especially in steeper soils. Slope. More than half of territory has slopes 25% and greater. Average altitude is 708 m and only 16% of territory is located at elevations of less than 100m above the sea level. There are seven rivers crossing the western coastal areas flowing to the Adriatic Sea. They often flood the lower parts affecting around 40,000 ha each year. Deforestation and overgrazing during the transitional period has further aggravated the situation. Lack of appropriate investments for soil conservation measures has also contributed to this problem.
Gully erosion
Land slide
Soil loss studies using watershed sediment assessment methods indicate that the river network transports in a year approximately:

- 60 million tons of fine and coarse sediment;
- 1.2 million tons of organic materials;
- 170 thousand tons of N, P, and K salts.
Coastal erosion

Coastal line in 1970

150 m

Bunker

Coastal line in 2004
Soil Pollution

Heavy metal concentrations near industrial sites

Steel plant
Cooper Minning
Iron-Nickel Plant
Cromium Minning
EU Threshold

Nickel (Ni)
Cromium (Cr)
Lead (Pb)

mg kg soil$^{-1}$

0 200 400 600 800 1000 1200 1400 1600

Nickel (Ni)
Cromium (Cr)
Lead (Pb)
Conservation practices:

- Improve vegetation cover,
- Re forestation,
- Preventing stream water flow,
- Improving drainage systems,
- Planning of measures for rehabilitation of rivers

Establish new forest belt for bank protection
Forestation

Increase density or rare forest for bank protection plant areas, created by sediment depositions
Bank Stabilization
Protection in hilly areas
Fences
Total content of heavy metals in toxic level in agriculture land of Albania

Source: SSI
Trends and Future Perspectives

• Land degradation is a continuous threat to Albania’s land resources and should be considered as a priority;

• The conservation practices should be focused on: controlling erosion, improving soil fertility, improving the irrigation and drainage system, enhancing land consolidation, up-dating digital soil databases, and promoting a sustainable use of land resources;

• Legislation for natural resources conservation and management should be also completed;

• Capacity building related to agricultural reform and institutional transformation. Coordination still remains an essential aspect that needs to be improved;

• Scientific Research in agriculture in addition to the plant nutrition issues should also focus on environmental aspects;

• All these efforts should take in consideration the needs and interests of the farmers.
Collaboration at the Balkan and European levels should be strengthened further. This is collaboration could be in areas such as information exchange, joint research projects and any other area as needed;
Thank You