



Overview of soil information and soil protection policies in Republic of Macedonia

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R. of Macedonia-general context

- The Republic of Macedonia is a land locked country, situated in the central part of the Southern Balkan Peninsula.
- The country is among the smallest in Europe, bordering four states.
- Topography of the country is characterized by big and high mountain massifs. Its territory is mountainous, crossed through with river valleys.
- The average height is 850 meters above the sea level.
- The River of Vardar cuts through the entire country. The country has three big tectonic lakes, 15 artificial lakes and 25 glacial lakes.



R. of Macedonia-general context

- Population: 2.022.547 inhabitants
- Area: 25.713 km²

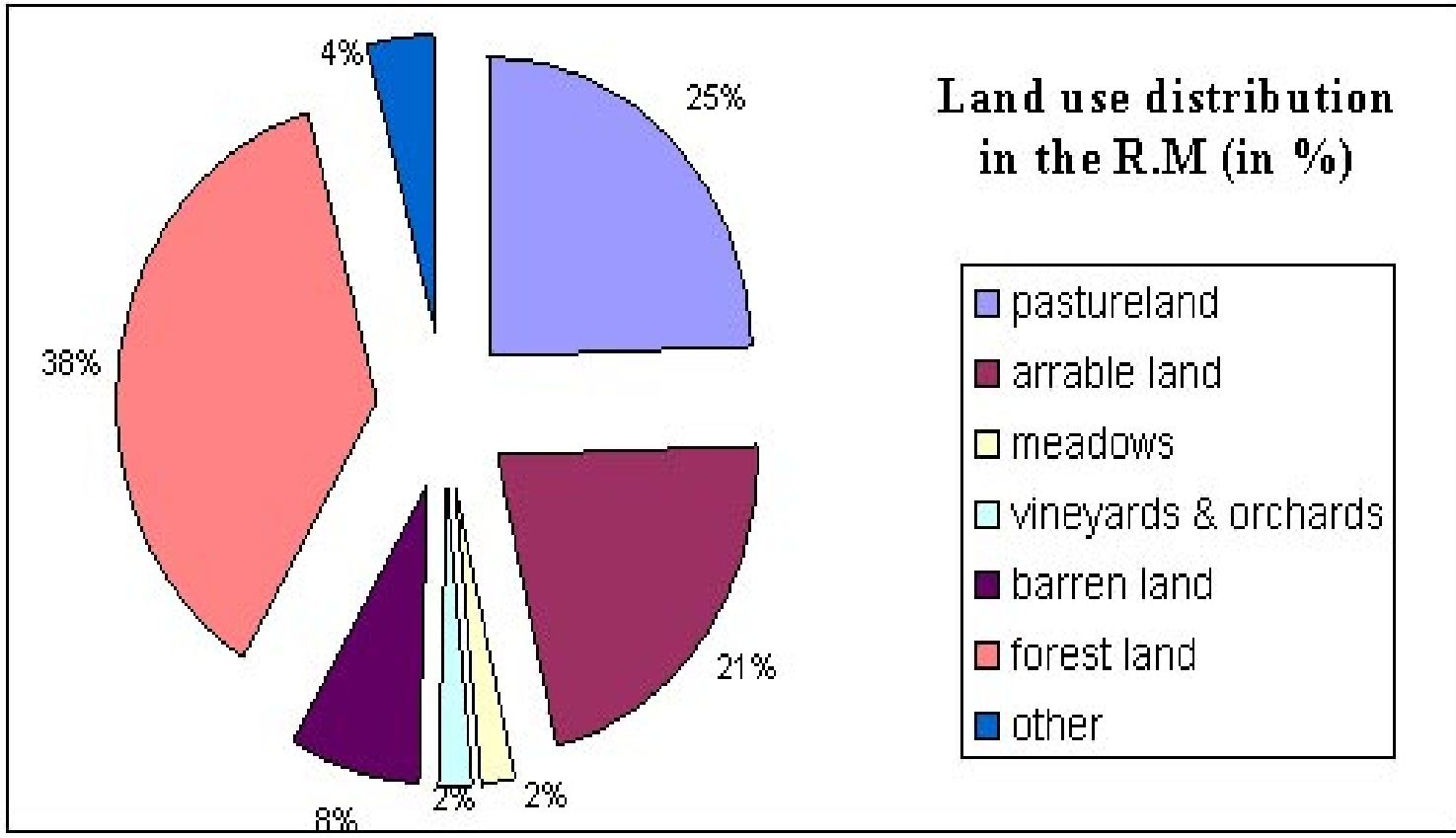


R. of Macedonia-general context

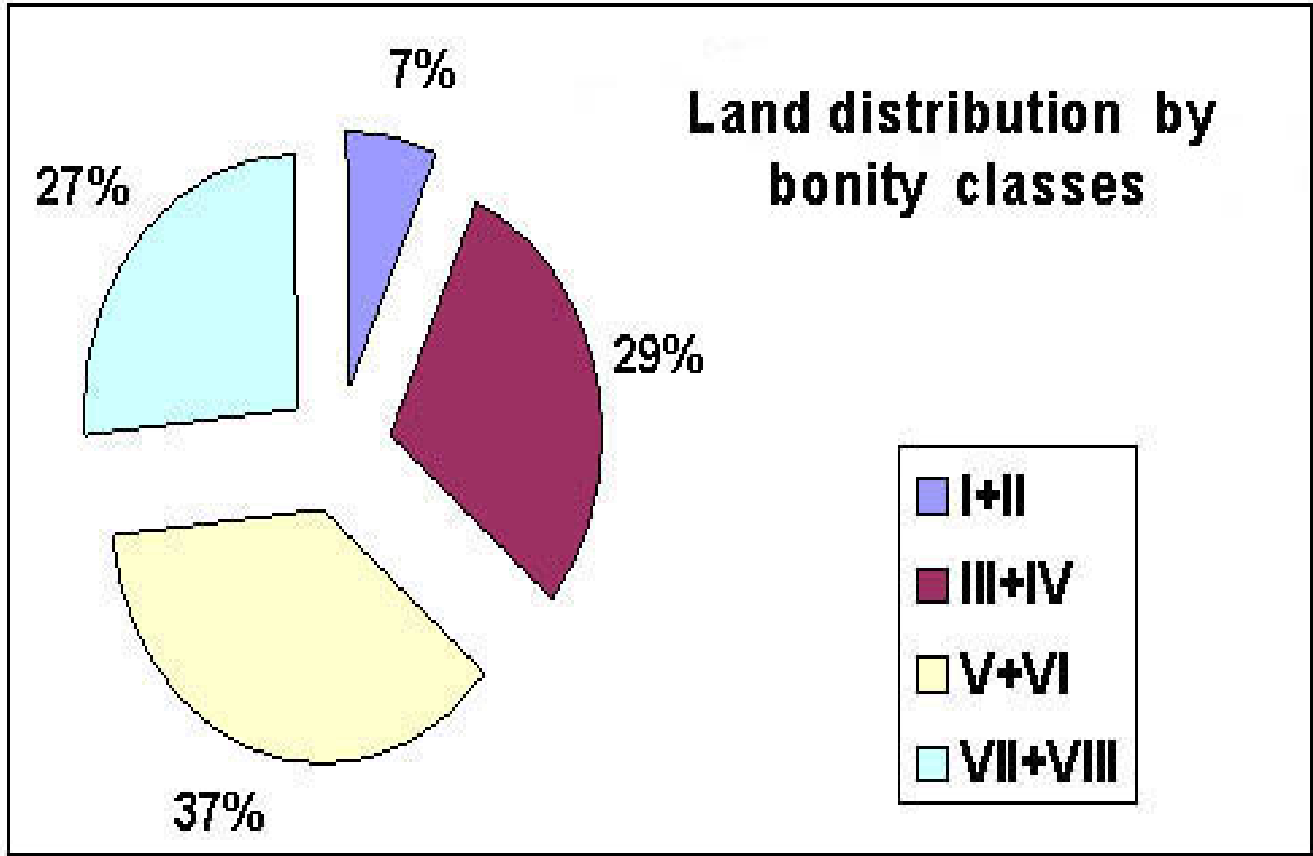
- Although small in size, Macedonia is characterized by high number of soil types, i.e. more than 30, thus representing a natural museum of almost all soils found in Europe.
- Forest and semi natural areas 60%; Agricultural areas 37%; Artificial areas 1%; Water bodies 2%.
Source: Corine Land Cover 2000.



Land use distribution



Land distribution by bonity classes



Threats against soils

- Soil erosion
- Contamination from local sources
- Diffuse contamination
- Hydro-geological risks
- Reduction of organic matters
- Land use change

Soil erosion

- In our country, water erosion is dominant type of erosion, especially the one caused by rain falls and running waters.
- Macedonia is one of the most endangered territories on the Balkans, in terms of erosion. This is due to the following reasons:
 1. Long lasting destructive impacts from man
 2. Relief in which mountains and valley alternate, involving sloppy and long inclinations
 3. Liability to erosion in certain sediments, rocks and soils
 4. Climate conditions, such as torrent nature of rain falls, climate aridity resulting in weaker coverage of soil by vegetation

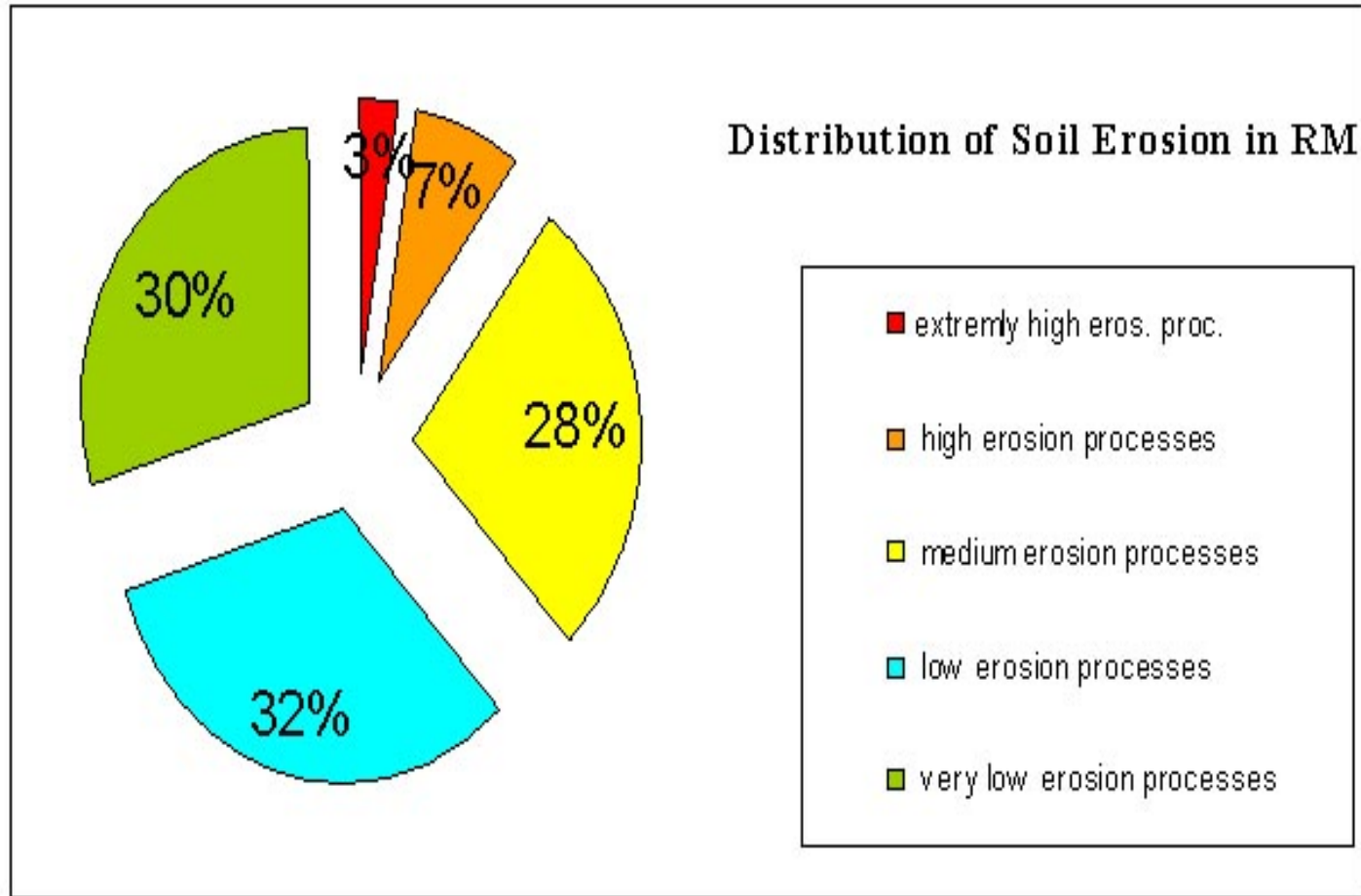
Soil erosion

- There are around 1700 torrent currents in our country, covering an area of 18.229 km². These torrents are divided into five categories of torrential strength, where the first category has the highest coefficient of torrential strength. The first three categories (extremely high, high and medium-strong erosion) require undertaking of protective measures.
- According to the report of the European Environmental Agency R. of Macedonia is placed in the so called "**red zone of water erosion in Europe**". Significant part of erosion deposits occur in natural lakes and reservoirs.
- Annual soil loss represents an annual average loss of arable soil layer of 20 cm depth on an area of 8.500 ha, which means 17.000.000 m³ of soil are lost every year. The economic cost of erosion impacts is considerable.



Soil erosion

According to the Erosion Map (1992) 96,5% of the total area of the country is under processes of erosion





Threats against soils

Contamination from local sources

- Soil contamination due to mining operation (open cast mine and underground mines) including the areas of excavation and adjoining areas or nearby facilities
- Soil contamination due to local sources relating to industrial and commercial sites, power plants and industrial waste disposal sites
- Soil contamination due to local sources relating to the disposal of municipal waste
 - In our country the deposited urban waste is 6000 cubic meter per year. There is only one landfill which is built properly (Drisla in Skopje); however, the waste is not recycled.



Threats against soils

Diffuse contamination

- Pollution of soils with acid rains may be of different origin, such as from thermal power plants in our country, as well as in neighboring countries.
- Soil pollution alongside highways in Macedonia is higher than in other unpolluted soils, but lower than in Skopje. This refers primarily to zinc and lead.



Threats against soils

Hydro-geological risks

- Soils may be polluted by contaminated surface and ground waters in case it comes into contact with them in any way. Due to the developed protection against flood of an area of close to 70.000 ha, contaminated river waters can not come into contact with soil through floods. Exceptions from this include several hot-spots, i.e. soils along rivers carrying polluted wastewater from mines in the eastern part of Macedonia.
- In Macedonia, 106 land reclamation systems and around 15 major accumulations have been constructed. Irrigation network has been developed, and different land areas of 80.000 ha are irrigated. Most of the land areas irrigated from artificial accumulations are located in upper course of the rivers, above the sources of pollution.



Threats against soils

Reduction of organic matters

- Slightly above 1/3 of natural forests in Macedonia have been preserved. Half of destructed forests have been conversed into pastures, and half into arable land areas, and bare areas have expanded as well. A significant component of the above soil degradation is the reduction of plant residues, humus and biogenic elements and decrease in natural soil fertility.
- In Pelagonia, one of the largest ravines in Macedonia used for cultivation of different agricultural crops, around 15% of the total quantity of humus have been lost during a period of 20 years. 0.75% of the total quantity of humus is lost every year, which means that biological degradation is low, i.e. below 1%.

Land use change

- Productive land resources in Macedonia have decreased through land use change, for example areas used for water accumulation, for development of new settlements and industrial facilities and construction of different infrastructure facilities. Migration from rural to urban areas have been present in Macedonia, leading to rapid urbanization, expansion of some settlements, without control being conducted over the type of land intended for development of certain facilities.
- According to data of CORINE LandCover 2000, around 1% of the area of our country is covered by continuous and discontinuous urban land, green urban areas, sport facilities, industrial and commercial facilities, roads, railways and airports, mines and landfills. Land use change has also impacts in terms of habitats fragmentation and disconnection of migration corridors of wild animal species.
- Demand for new buildings and for better transportation structure continues to grow in the Republic of Macedonia.

Policy

Soil protection in the Republic of Macedonia is regulated by several laws, including those covering the matters of nature protection:

- The Low on Environment (Official Gazette of the Republic of Macedonia No. 53/05 and amendments Official Gazette of the Republic of Macedonia No. 81/05)
- The Low on Agricultural land (Official Gazette of the Republic of Macedonia No. 25/98),
- The Low on Nature Protection (Official Gazette of the Republic of Macedonia No. 67/04)
- The Low on Spatial and Urban Planning (Official Gazette of the Republic of Macedonia No. 51/05)



The Low on Environment

- According to Article 2 of the Law on Environment the scope of the law includes protection and improvement of the quality and the state of environmental media, including the soil.
- The same Law, in its Article 9, stipulates the implementation of the polluter pays principle, and Article 13 provides for the precautionary principle, that would help to avoid local contamination of soil in future.
- Article 36 stipulates internal monitoring for legal and natural persons possessing sources of emissions and by their activities make impacts on one or more media and areas of the environment



The Law on Nature Protection

- Article 11, restricts the change in land use, and
- Article 12 prohibits nature use in a manner that leads to soil degradation and loss of its fertility, damage to or destruction of biological and landscape diversity etc.

The Law on Agricultural Land

- In its Article 31, provides for the protection of agricultural land against pollution and infection, for the purposes of safe food production, human health protection, protection of flora and fauna and uninterrupted use and protection of the environment. The same Article stipulates that the Ministry of Agriculture, Forestry and Water Economy specifies matters that are harmful to agricultural land, determines their maximum permissible concentration in soil and measures to be undertaken on agricultural land of higher concentration of harmful matters in order to reduce them below the permissible levels. However, this has not been achieved yet.
- Article 32 of the same law specifies the measures and the activities undertaken for the purposes of protection against and prevention of erosion of agricultural land, presence of contaminating matters and potential adverse effects on human health or on the environment.

The Low on Spatial and Urban Planning

- Article 2 explains the adoption of the spatial plan and urban plans with the aim to secure space organization and humanization and environment and nature protection and promotion
- Article 4 of the same law states the basic principles of space planning and organization among them being the principle of sustainable development and environment and nature protection and promotion

Environment management, monitoring and access to environmental information

- Permanent monitoring, i.e. systematized measurement, monitoring and control of the state, quality and changes in the soil as environmental media in the Republic of Macedonia does not exist.
- The only monitoring of the state of the soil concerning certain heavy metals, such as lead, zinc, and cadmium was carried out in the area of Veles in the course of 2004 and 2005, as one of the most endangered and most contaminated areas in the country, due to the long operation of the Lead and Zinc Smeltery. Such monitoring was conducted by the Institute for Health Protection in Veles.
- There has been no comprehensive strategy and national policy for contaminated sites management or specific legislation to regulate contaminated sites investigation and cleaning up.



Environment management, monitoring and access to environmental information

- Macedonian Environmental Information Centre within the Ministry of Environment and Physical Planning is responsible for collection of data and information related to any way of soil degradation and contamination, land use change, erosion, salination, etc.
- Such data is processed and annual reports are published, different indicators are developed and public is informed on the state of the soil as environmental medium.
- Data and information of the Macedonian Environmental Information Centre originate from certain published papers, mainly as scientific works and books of individual authors or group of authors, as well as established environmental statistics.

Outlook

There has been an increasingly recognized need to adopt appropriate law in the Republic of Macedonia, to regulate soil from several points of view, as environmental medium.

- It is necessary to establish the maximum permissible concentrations in soils for different purposes, with regard to heavy metals, certain substances as pesticides, polycyclic aromatic hydrocarbons, halogen hydrocarbons, etc.
- According to the current legislation, as well as to the forthcoming new legislation, there is an evident need for establishment of permanent monitoring of the soil, with an accent on areas with highest contamination of the soil.
- The presence of industrial and commercial sites with certain degrees of soil degradation in Macedonia, as well as tailings disposal sites as part of the operations of the mines in the past, pose the necessity to undertake measures and activities for remediation and reclamation of the soil, i.e. restoration of soil and environment as a whole into their original state, a state that would not pose risks for biodiversity and for human health.

Conclusions

In the domain of soils management in the Republic of Macedonia, the main priorities include:

- The upgrading of legislation on soil as environmental medium;
- Overcoming of pollution from local industrial and commercial sources and municipal landfills, as well as transboundary air pollution;
- Prevention of uncontrolled land use change in urban areas;
- Control of soil erosion,
- Identification of funding sources for reclamation of historical soil contaminations due to the operation of mines in eastern parts of Macedonia and industrial facilities.
- Making and digitalisation of soil map in the scale 1:50 000