

Ecological state of farmland in Bulgaria and measures for its preservation and improvement

Opatření k ochraně a zlepšování ekologické stability zemědělské půdy v Bulharsku

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The area of arable land in Bulgaria continually decreases. In 2000, the amount of arable land per 1 Bulgarian resident is 0.59 ha. According to this indicator, Bulgaria is in the group of the countries of the least availability of arable land. For the purpose of comparison, we may point out that in Canada this indicator is 3.8 ha and in the USA – 2.4 ha. During the last 25 years, 227 thousand hectares have fallen out of the Arable Land Fund of Bulgaria (2, 1989).

Bulgarian soils are very fertile which makes them suitable for the cultivation of more than 145 agricultural crops. The climate is favorable for agricultural production. Such a combination between fertile soil and favorable climate is a very rare phenomenon and the country is unique in this respect. It is our responsibility and duty to use the country's natural resources in a right way in order to preserve their production potential and the environmental balance.

The purpose of this investigation is to analyze the environmental state of farmland in Bulgaria and to outline the measures for its preservation and improvement.

On the basis of soil quality and characteristics of the climate, agricultural land in Bulgaria is divided into 10 categories and on the basis of erosion degree, into 8 classes. First class agricultural land forms 14.3% of total agricultural land, second class – 19.7%, third class – 25.3%, fourth class – 21.3%, fifth class – 6.5%,

sixth class – 6.39%, seventh class – 5.9%, and eighth class – 0.7%. The share of second, third and fourth classes of land is the greatest and the share of eighth class land is the smallest one (3, 1980).

The Environment Agency is authorized to organize and supervise the activity of the National Computerized System of Environmental Monitoring, which releases information as to the quality of the environment in Bulgaria on a regular basis. The national network of environmental monitoring has been set up complying with both national and the EU environmental standards, aiming to monitor and assess the found background of the country's environment and to report any change occurring as a result of anthropogenic effects on nature. The data collected are published in quarterly and yearly bulletins.

Land and soil quality is monitored in respect to heavy metal pollution (318 stations distributed by sources of pollution), stable organic contaminants (98 stations for poly-aromatic hydrocarbons, polychlorobiphenyls, chlororganic compounds/prohibited pesticides and 48 stations for pesticides), acidification (70 stations) and salination (15 monitoring stations). The implementation of a mathematical model of water erosion forecast assessment is imminent (4, 1999).

The monitoring stations are located throughout the country, allowing for the timely and accurate recording of soil quality change. The industrial enterprises,

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mines and wastewater are the key sources of soil pollution and contamination. Chemisation (plant protection preparations containing heavy metals), irrigation (rivers contaminated by wastewater from mines) and automobile transport cannot be identified as a potential danger of soil pollution.

The most serious problem in Bulgaria is the erosion. Nearly 80% of arable lands in Bulgaria are subject to erosion processes. Permanently affected by water erosion are 4.9 million hectares, which is 43% of the total area of the country. From this territory, the erosion affects very strongly and strongly the area of 802 000 ha and 875 000 ha need urgent anti-erosion defense. The implementation of a mathematical model of water erosion forecast assessment is imminent. Nearly 30% of arable land, that is 1.6 million ha, are affected by wind erosion. From 30 to 60 million tons of fertile soil are lost every year.

Genetically acid soils in the country occupy nearly 50% of country's territory. From the total amount of arable land, 15.1 million hectares are acidified (pH < 5.6).

- Slightly acid soils (pH 5.1–5.6) – 630 thousand hectares;
- Moderately acid soils (pH 4.6–5.0) – 460 thousand hectares;
- Strongly acid soils (pH 4–4.5) – 310 thousand hectares;
- Very strongly acid soils (pH < 4) – 110 thousand ha.

Soil acidification has led to changes in soil microbiological properties, disruption and disintegration of the soil structure, causing a growing leakage of soil nutrients and ultimately a loss of soil fertility.

Saline soils cover 35 thousand ha, accounting for 0.6% of the country's arable land and 2.4% of Bulgaria's

areas under irrigation. From this number, 252 hectares have been industrially salinated due to spillover and incidences close to salt pit facilities. Soils that have undergone secondary salination are to be found in vast fertile and plain areas around the country, which are suitable for mechanized cultivation and irrigation following land improvement.

Contaminated lands and soils with *heavy metals and arsenic* occupy 43 660 hectares which is 1% of agricultural land. They are concentrated around industrial zones of non-ferrous metallurgical plants.

Contaminated lands and soils with *oil products* occupy 137 hectares and contaminated lands and soils with *radi-onuclides* – 1 049 ha.

The main sources of soil contamination in the country are the large industrial enterprises, mines and industrial wastewater. Contamination with pesticides is of local character mainly in areas that are close to large industrial centers.

The drastic decline in the use of fertilizers can be identified as one of the reasons behind the decline of agricultural output (Table 1). Since 1981, the use of fertilizers has drastically declined. From 227 kg/ha in 1981, their use decreased almost ten times reaching the level of 24 kg/ha. The use of phosphorous and potassium fertilizers has also decreased from 90.16 kg and 1.89 kg to 26.84 kg and 1.44 kg respectively. The lack of balance in the use of fertilizers is a common practice in Bulgaria. It is characterized by destroying the proportion between the elements. The year 1998 witnessed a record low use rate of mineral fertilizers. The optimal proportion of N : P : K = 1 : 0.8 : 0.4 in 1998 was 1 : 0.08 : 0.04. This leads not only to the decrease of yields, but also to the irrational use of fertilizers. The quantity of humus in arable lands has decreased by 30–50% compared to virgin soils. The use of pesticides also decreases substantially (1, 1999).

Table 1. Use of fertilizers in agriculture in 1981–1999

	NPK		N		P ₂ O ₅		K ₂ O	
	t	kg/ha	t	kg/ha	t	kg/ha	t	kg/ha
1981	1 056 369	226.98	511 761	109.94	419 688	90.16	125	26.84
1990	–	161.47	–	112.03	–	28.55	–	20.89
1995	142 127	30.96	129 545	27.6	12 426	2.68	156	0.03
1996	164 894	35.61	151 883	32.36	12 824	2.76	187	0.03
1997	163 922	36.47	145 773	32.49	16 275	3.58	1 864	0.40
1998	113 146	24.11	97 497	20.77	8 900	1.89	6 749	1.44
1999	156 344	33.31	140 269	29.88	10 376	2.21	5 699	1.21
2000	163 569	34.85	144 928	30.88	16 104	3.43	2 537	0.54

Source: Statistical Yearbooks, NS

The fact that use of fertilizers is well below the scientific requirements has a number of negative consequences; however, there is one advantage and it is the fact that agricultural production is environmentally clean. Consumers are willing to pay a higher price for ecologically clean products but for this purpose, agricultural producers need a certificate of some kind. This is a new market niche and our country will not face much competition. This is an opportunity for increasing the income of Bulgarian agricultural producers. Although presently Bulgaria exports ecologically clean agricultural products, the lack of such certificate does not allow selling at a higher price.

The program "Eco-Agriculture" supports investment projects amounting up to 80 thousand levas for production of ecologically clean agricultural products, for improvement of soil fertility, for new construction.

At the end of 1998, representatives from the Ministry of Agriculture and Forestry (MAF), Ministry of Environment and Water Supply together with a number of non-governmental organizations approved a strategy for encouraging sustainable development of agriculture in Bulgaria. In 2000 MAF developed a strategy for preservation, restoration and improvement of soil fertility (4, 1999).

The National Agriculture and Rural Development Plan for the 2000–2006 period also provides financial support for pilot projects according to the *Measure 1.3. Development of Environmentally Friendly Agricultural Practices and Activities*. Its main objective is encouraging agricultural producers to apply environmentally friendly agricultural production methods and preserve the quality of land resources. The obligations of agricultural producers involve development of organic farming for a period of the least duration of 5 years in accordance with the Ordinance No. 15/1999 for biological crop breeding and livestock breeding.

The most important agri-environmental actions in the measure according to the farmland are:

– *Intensification of grazing systems*

These activities aim at the reduction of pollution of agriculture, protection of wild flora and fauna, protection against erosion. The obligations of agricultural producers are the following: to respect a certain grazing density below the optimum to be defined in each pilot project; to respect timing of grazing (beginning and end of grazing period); to respect landscape features of the pasture lands for at least a 5 years period.

– *Conversion of arable land to extensive permanent pasture land in environmental sensitive areas and in areas with high erosion potential*

The objectives are: protection from erosion, reduction of pollution from agrochemicals, protection of bio-diversity.

– *Management of abandoned agricultural lands*

This involves a general clearance of abandoned land from the unwanted vegetation and planting activities according to the future use of the land as determined by the pilot project (pasture land, special plants for honey production, aromatic, pharmaceutical and other non-food plants) for at least a 5 years period. Saline soils are considered a priority.

All actions of the measure will be administrated by the SAPARD Agency: It will select a competent organization to do the monitoring of the measure as a whole or for each action separately. There will be an evaluation committee with the participation of the MAF, Ministry of Environment and Waters, regional authorities, NGOs and research institutes. Various economic, social (creation of new employment) and environmental (soil fertility, biodiversity, characteristics of landscape, environmental pollution) indicators will be monitored.

The average direct payment per ha will be 150 lv/ha (76.2 EURO/ha). This national average level of the direct payment may significantly vary, depending on the specific agri-environmental action, the region of the pilot project and the incentive percentage. The total scope of this measure is 32 000 ha by the end of 2006 and 12 million EUR, 75% of which will be supplied by the SAPARD Fund and 25% by national sources.

Agroecology is an important part of the EU legislation and gradually it becomes important for the Common Agricultural Policy as well. During the last few years, Bulgarian legislation concerning agriculture is being adapted towards developing sustainable biologically-based agriculture and environmentally friendly agriculture.

The main weak point of Bulgarian legislation was formed by implementing "the trial-and-error" method. There was not sufficient clarity as to the legislative and other instruments that the state intended to use in conducting the reform in agriculture and implementing its policy in the field of agriculture and particularly in the field of land relations and the corresponding laws.

According to the *Law of Ownership and Use of Farm Land (LOUFL)*, the contaminated, eroded, saline, sour, moistened farm land is restored to the owners and the money for the restoration of its fertility are granted by the Ministry of Agriculture and Forestry in accordance with a program that is annually affirmed by the government.

This problem could have been solved more easily and more efficiently if the state had first restored the fertility of land and then restored it to the owners. In case the process of fertility restoration was lengthy, it would have been best if the state had compensated the owners by giving them land from the State Land Fund or leasing them land free of charge. In cases of minor damage, land could be restored to the owners. The fragmentation of damaged land creates additional difficulties for the restoration of fertility as well as for the exercising control over the rightful spending of money, following of agro-technical requirements and concluding deals with such land. The control for purity of agricultural produce is incomplete and ineffective and agricultural producers can sell products containing heavy metals above the acceptable levels. The consequences in case contamination of agricultural produce for export is ascertained are very severe.

The amendments and complements to the Farmland Protection Act in 2000 aim at achieving the following objectives: (1) simplifying the procedures for changing the use of agricultural land for non-agricultural purposes; (2) distribution of activity; (3) to enhance administrative transparency.

It is necessary to improve the *Tariff for Fees Paid upon Changing the Purpose of Land* that are charged upon changing the purpose of land use. Their level depends primarily on the category of land as well as the level of minimum wage. Other indicators such as land location and availability of irrigation facilities are measured by correction coefficients. However, they are not sufficient, they do not reflect important qualities of land, their differentiation is minor and it does not reflect the market importance of the factors they measure. As a result of this, the fees paid for land that is close to bigger towns where the demand and prices are the highest are disproportionately low. That is why the Farmland Protection Act does not fulfill well its purpose.

A major weakness as far as various local and national institutions responsible for the management, control and preservation of land resources are that they work separately and this reduces the effectiveness of their activity. It is necessary that a national center be established that will synchronize the activity of various institutions dealing with different issues regarding land relations. This center will participate in the creation and implementation of the state policy regarding land resources. Such a responsibility could be assigned to the Council of Land Relations or Land Agency. This Council/Agency will provide the methodical management and will exercise control over the state and effective use of land resources as

well as will be responsible for the maintenance and restoration of land fertility.

CONCLUSIONS

On the basis of this investigation, the following important conclusions and recommendations can be made:

Bulgaria is characterized by fertile soils and favorable climatic conditions which favor the cultivation of more than 145 varieties of agricultural crops. That is why land resources are of great importance for the country. In addition to that, the availability of land per 1 resident is comparatively low which makes it even more important to take measures for its preservation.

Recently an increase of the total amount of contaminated land is observed although their relative share is low. The most serious problem in this respect is water erosion that has affected 80% of the total arable land.

Due to the low share of contaminated/polluted land as well as the drastic decrease in the use of fertilizers and pesticides, especially after the reform in agriculture started, most of the available farmland is ecologically pure. This fact is a precondition for the country to find a new niche on international markets of agricultural goods.

The priority measures of the governmental policy regarding environmentally friendly methods in agriculture, preservation of land resources and encouraging agricultural producers to apply these methods have found place in the National Agriculture and Rural Development Plan over the 2000–2006 period.

The main weak point of the legislative adaptation that was carried out during the last few years that aimed at creating sustainable biological and environmentally friendly agriculture as well as synchronizing Bulgarian legislation with the legislation of the EU is that very often the “trial-and-effort” method was implemented and thus insecurity and instability were generated.

Various local and national institutions responsible for the management, control and preservation of land resources work separately and this reduces the effectiveness of their activity. It is recommended that the Council of Land Relations or/and Land Agency be established that will synchronize the activity of various institutions and will provide the methodical management, will exercise control over the state and effective use of land resources and will be responsible for the maintenance and restoration of land fertility.

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