STATE OF THE ENVIRONMENT REPORT – SLOVAK REPUBLIC

2018

25th anniversary of annual reports

MINISTRY OF ENVIRONMENT OF THE SLOVAK REPUBLIC

SLOVAK ENVIRONMENT AGENCY

SOIL

KEY QUESTIONS AND KEY FINDINGS

What is the status and trends in land use?

The total area of the SR was 4 903 407 ha in 2018, of which agricultural land made up 48.5%, forest land 41.3% and non-agricultural and non-forest land 10.2%. Between 2005 and 2018 there was a decrease in the area of agricultural land of 2.2% (-53 878 ha) to the current 2 379 101 ha. There was an increase recorded in the area of water bodies of 2.1% (+1 915 ha) and forest land of 1% (+20 793 ha), while the highest percentage increase compared to 2005 was for built-up areas and courtyards, of 5.1% (+11 632 ha). The area of agricultural land has continued to fall since 1993, primarily to the benefit of built-up areas and courtyards.

Are limit values for hazardous substances in agricultural land being met?

The development of contaminated soil after 1990 has been very gradual, without significant changes. Soil that was contaminated in the past remains contaminated today. However, almost 99% of the agricultural land fund complies with hygiene requirements. The remainder of the contaminated soil is linked primarily to industrial activity and the so-called geochemical anomalies – mountain and foothill areas. When comparing the 5th monitoring cycle (sampling year 2013) with the preceding 4th monitoring cycle (sampling year 2007) a positive trend was recorded for the monitored contaminated localities in the total content of As and Cd and a negative trend in the case of Co, Cu, Ni and Zn.

Is the area of agricultural land with acidic soil reaction increasing?

The results of agrochemical testing in the cycle periods (1990-1994) and (2012-2017) have shown an increase in the area of agricultural land with acidic (+6.1%), weakly acidic (+9.1%) and alkaline (+1.4%) soil reaction. A decrease was recorded in the area of agricultural land with neutral (-16.6%) soil reaction. The sub-values calculated for 2018 show that the area of agricultural land with acidic or weakly acidic soil reaction is still increasing.

What is the share of agricultural land threatened with erosion, compaction and salination?

In 2018, 38.5% of agricultural land in the territory of the SR was potentially threatened by water erosion and 5.5% by wind erosion. Since the end of the 3rd monitoring cycle (2006) to the present status, potential water erosion has had a falling trend. The area of potential wind erosion is not high and over recent years has not significantly changed. From a long-term perspective, a comparison of the area at the end of the 1st monitoring cycle (1996) and in 2018 showed a decrease in the area of soil affected by water erosion of 374 333 ha and by wind erosion of 44 705 ha, however this reduction is largely the result of the improved elaboration of the erosion model used (USLE).

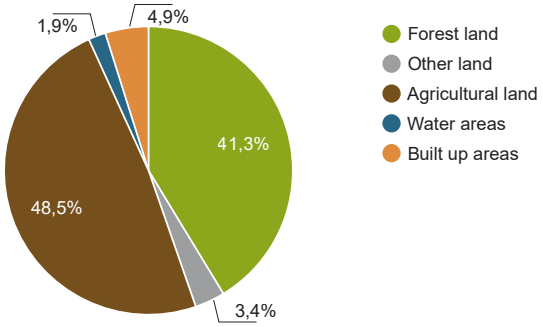
Resistance to compaction increases from heavy to light soils. The risk of compaction, expressed as a percentage of compacted localities to their total quantity within the framework of the given soil type, was 8% for light soils in 2018, 29% for medium soils and 35% for heavy soils. Within the framework of 5 sampling cycles (1996-2013) a negative trend was recorded in the development of compaction for light soils, while more significantly for other textures only from the 3rd monitoring cycle (excluding heavy mollic soil, black soil and fluvisol) and this especially in topsoil, which is probably a consequence of the intensive use of these soils depending on the crop being grown, or the minimising machine activity on the soil.

Soil salinization processes are not very widespread in this country. They apply to warm areas with a prevailing soil evaporation regime, to flat relief elements with high level of strongly mineralized groundwater. At present under 5 000 ha of saline land is registered in the SR, or approximately 0.2% of agricultural land.

SOIL BALANCE

The total area of the SR is **4 903 407 ha.** In 2018 agricultural land covered 2 379 101 ha, forest land 2 026 027 ha and non-agricultural and non-forest land 498 279 ha.

Chart 027 I Share of individual types of land in total Slovak territory (2018)



Source: GCCA SR

Anthropogenic pressure to use land for purposes other than fulfilling its primary production and environmental functions is causing its gradual decrease. The development of the land fund in the SR was marked by a **further decrease of agricultural and arable land** in 2018.

SOIL QUALITY

Soil contamination by hazardous substances

From the perspective of soil contamination, monitoring in 2018 focused on the main hazardous elements Cd, Pb, Cu, Zn, Ni and As which, in the preceding 4th monitoring cycle (sampling year 2007), reached over-limit values within the meaning of the amended Decree No 59/2013, implementing Act No 220/2004, on the protection and use of agricultural land and on amendments to Act No 245/2003, on integrated environmental pollution prevention and control and on amendments and supplements to some other Acts. Within the framework of the assessment of the status of soil hygiene there was, from the 4th monitoring cycle, a change to legislation (addition of aqua regia extract), and so it is not possible to compare the data with previous monitoring cycles. It was, however, found that soils contaminated in the past remain contaminated today, and so it will be necessary to continue to pay increased attention to them.

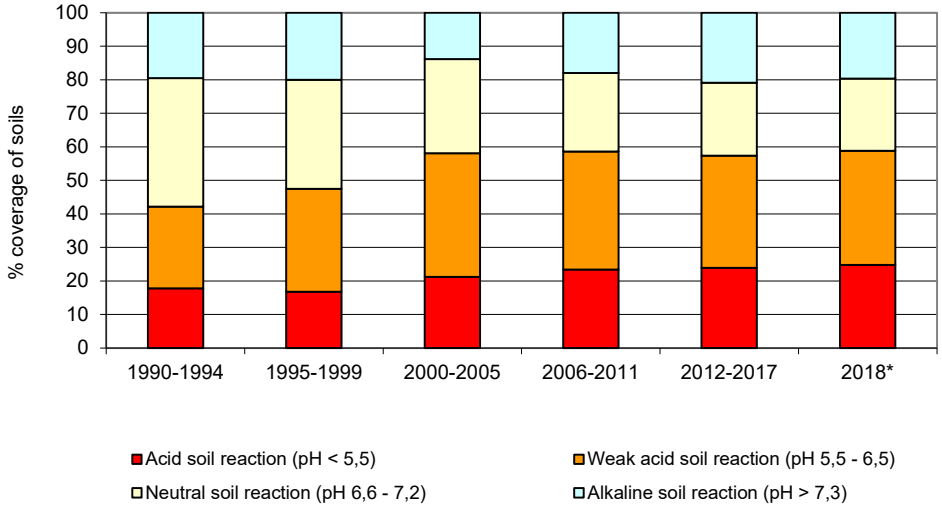
Based on previous observations, when comparing the 5th monitoring cycle (sampling year 2013) with the preceding 4th monitoring cycle, at the monitored contaminated localities **a positive trend in the development of the total content of As and Cd and a negative trend in the case of total content of Co, Cu, Ni and Zn** were recorded.

The last and newest hygiene survey of agricultural land around the aluminium plant in Žiar nad Hronom showed that the area of soil contaminated with fluorine has slightly decreased, as has the concentration of fluorine in the soil, confirming the improved emissions situation in the region. On the other hand, the process of reducing the concentration of monitored and assessed elements in the soil is very slow. Localities that were contaminated in the past (around industrial plants, around geochemical anomalies) remain contaminated today, which means that the soil is maintaining this unfavourable status relatively well and over the long term. The contents of the monitored elements at these localities are above 80% of the set limit, and hence it will be necessary to continue monitoring them.

Soil acidification

The optimal **soil reaction value** is one of the key aspects when evaluating soil. In recent decades, anthropogenic agents have been a major contributor to changes in soil reaction. The use of physiologically acidic fertilizers and acidic atmospheric pollutants have contributed to increased soil acidification. The results of agrochemical soil testing in the cycles period (1990-1994) and the last completed cycle (2012-2017) have shown an **increase in the area of agricultural land with acidic** (+6.1%), **weakly acidic** (+9.1%) **and alkali** (+1.4%) **soil reaction**. On the other hand, a decrease was recorded in the area of agricultural land with neutral (-16.6%) soil reaction.

Chart 028 I Trend in soil reaction in agricultural land based on the results of agrochemical soil testing



*Note: *partial values for the relevant year*
Source: Central Control and Testing Institute in Agriculture

Soils with weakly acidic and acidic soil reaction may result in increased penetration of various pollutants, primarily heavy metals and aluminium, into the food chain. **The status of active aluminium** in agricultural land in the SR is significantly **lower in arable soils than in grassland**, which is a consequence of the relationship between soil quality and its use. Despite this, high maximum values have also been measured in arable soils, which directly correlates with a lower soil reaction value.

Salinization and sodification

A mild to moderate salinization intensity, with a salt content of 0.10 to 0.35% was recorded in 2018 at the locality Kamenín, a high (salt content 0.36 to 0.70%) to extreme salinization (salt content over 0.70%) at the Malé Raškovce and Žiar nad Hronom localities. Weak salinization was confirmed at the Gabčíkovo and Kamenín localities.

A content of exchangeable sodium in the sorption complex in a range of 5 to 10%, indicating weak sodification, was found at the Iža, Zemné and Komárno-Hadovce localities in sub-topsoil horizons. At the Zlatná na Ostrove, Žiar nad Hronom, Kamenín and Malé Raškovce localities the content of exchangeable sodium was in the range of 10 to 20%, which is characteristic for salinized soil. A soil reaction value (pH) as an indicator of soil sodification confirming a strongly alkaline reaction (pH> 8.4) was measured only at the Kamenín locality.

Organic carbon in soil

Climate change and intensive changes in soil use mean that the organic carbon stock in soils is changing quite rapidly. Monitoring results have shown that the average values for the content of organic carbon **in the topsoil horizon of arable soils** (AS) of the same soil types are **significantly lower than for permanent grassland** (PG). This status is a consequence of the intensive mineralization of soil organic matter during ploughing of pastures and the long-term intensive cultivation of arable land. In the AS, the highest value of organic carbon in soil is found in black soil and the lowest in pseudogley and brown soil.

Soil erosion

751 334 ha of agricultural land in the SR is **potentially affected by water erosion** (of differing intensity).

The area of land **potentially affected by wind erosion is 106 851 ha.**