MINISTRY OF EDUCATION, RESEARCH, DEVELOPMENT AND YOUTH OF THE SLOVAK REPUBLIC

VER 2026

Periodic Assessment of Research, Development, Artistic and Other Creative Activities VER 2026

Final Report of the Environmental and Ecological Sciences Sub-panel

Executive Summary

Environmental and Ecological Sciences in Slovakia demonstrate methodological competence and institutional stability. However, the field does not currently operate at a level consistent with internationally leading research systems.

While several research groups produce internationally visible outputs, excellence remains fragmented and is not yet systemic across the field. A substantial share of the research activity remains incremental and regionally framed, with limited evidence of agenda-setting scientific leadership in the international research landscape.

Structural weaknesses are visible in several areas. These include limited integration with industry in applied environmental domains, insufficient international research leadership roles, uneven methodological quality assurance in analytical work, and limited demonstrable societal impact beyond narrative claims.

The Sub-panel also notes that structural indicators describing the research environment often appear stronger than the measurable scientific outputs they are intended to support.

Environmental and Ecological Sciences in Slovakia are therefore not failing. However, without strategic adjustments the field risks remaining scientifically competent while becoming increasingly peripheral within the European research landscape.

Key strategic priorities include stronger concentration of excellence, deeper integration with industrial partners, improved methodological standards, better documentation of societal impact, and stronger incentives for international research leadership.

1. Overall Scientific Position: Stable but Strategically Underperforming

Environmental and Ecological Sciences in Slovakia demonstrate methodological competence and institutional stability. However, the field as a whole does not currently operate at a level consistent with internationally leading research systems.

While isolated research groups achieve internationally excellent outputs, excellence is not systemic. A substantial share of the research remains incremental, regionally framed, and technically competent, but rarely agenda-setting at the international level.

This is not a crisis of competence. It is a crisis of strategic positioning.

If current structural patterns persist, the field risks long-term marginalisation within European research landscapes.

1 a. Applied Quality Standards for Outputs (Directive-aligned)

To support transparency for applicants, the Sub-panel summarises the typical characteristics considered when assigning output quality levels. In line with the Directive criteria, assessments focused primarily on Originality, Significance and Rigour.

In accordance with Article 10 of Directive No. 03/2025, outputs were assessed exclusively against these criteria. In line with Annex No. 1 of the Directive, the Outputs domain carried a weighting of 70%, with Social Impact and Creative Environment each weighted at 15%.

2. Engineering-Level Work vs Research-Level Innovation: A Structural Warning

A substantial proportion of outputs in wastewater technologies, air pollution control, soil remediation and environmental monitoring resemble applied engineering practice rather than cutting-edge scientific innovation.

In several cases, the scientific level does not clearly exceed what could be delivered by advanced environmental engineering consultancies.

Research-led universities should aim to generate frontier research rather than consultancy-level technical reporting.

3. Weak Industry Integration: Innovation System Gap

There is minimal visible evidence of structured collaboration with industrial partners in applied environmental domains.

Without industry embedding, research risks remaining academically isolated and technologically conservative, weakening both national innovation capacity and international competitiveness.

4. International Positioning: Participation Without Leadership

International collaboration networks are present but often reflect co-authorship rather than intellectual leadership.

Relatively few outputs show Slovak researchers as coordinating or agenda-setting leaders. A shift toward intellectual ownership and leadership in international research programmes is strategically essential.

5. Limited Conference Presence and Scientific Visibility

Scientific leadership is reinforced through active participation in major international conferences and scientific fora.

The documentation reviewed does not demonstrate systematic high-level visibility in global environmental research arenas.

6. Methodological Rigour and QA/QC Deficiencies

Repeated evaluator comments indicate insufficient QA/QC protocols in environmental analytical outputs.

In environmental chemistry and environmental engineering, methodological rigour is fundamental to international credibility.

7. Social Impact: Narrative Claims vs Measurable Outcomes

Application potential is frequently asserted, yet measurable societal impact is often insufficiently documented.

Public funding justified through societal benefit requires verifiable implementation metrics.

8. Overreliance on Structural Indicators (Creative Environment)

Strong strategic documents and collaboration networks do not automatically translate into internationally leading science.

There is a risk of overvaluing formal structures relative to measurable output quality.

9. Strategic Warning to the Ministry

Environmental and Ecological Sciences in Slovakia are not failing, but risk remaining scientifically competent while becoming strategically peripheral within the European research landscape.

Priority actions include:

- concentration of excellence
- stronger industrial embedding
- support for early-career researchers
- addressing structural inequalities
- strengthening methodological standards
- incentives for international scientific leadership

Sub-panel members

Steven Bouillon, Katholieke Universiteit Leuven

Jon Bridle, University College London

Giovanni Esposito, Università degli Studi di Napoli Federico II

Salwa Karboune, McGill University

Reinhard Niessner, Technische Universität München (Sub-panel Chair)